

STUDIES ON GREEN MANURING OF EUPATORIUM (*CHROMOLAENA ODORATA* L.) IN AROMATIC RICE (*ORYZA SATIVA*)

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ABSTRACT

Field experiments were conducted at the Agricultural Research Station Mugad, University of Agricultural Sciences Dharwad (Karnataka) on green manuring of eupatorium (*Chromolaena odorata* L.) in aromatic rice (*Oryza sativa*) during kharif and Rabi seasons of 1998-99 and 1999-2000. The effect of eupatorium green manuring on transplanted aromatic rice and its residual effect on ratoon aromatic rice was studied.

The first experiment consisted of 4 eupatorium levels (*i.e.* 2.5, 5.0, 7.5 and 10.0 t ha⁻¹) and were compared with RDF (100: 50: 50 N, P₂O₅ and K₂O kg ha⁻¹), FYM (5 t ha⁻¹), RDF + FYM, sunnhemp (2.5 t ha⁻¹) and absolute control. The second experiment consisted 4 eupatorium levels (2.5, 5.0, 7.5 and 10.0 t ha⁻¹) in combination with 3 fertility levels viz., no fertilizer 25 and 50% of RDF were compared with 100% RDF (100:50:50 N, P₂O₅ and K₂O kg ha⁻¹) FYM (5t ha⁻¹) RDF + FYM and absolute control treatments.

The grain yield (32.85 q ha⁻¹) and net income (Rs. 3929 ha⁻¹) transplanted rice was significantly higher with RDF + FYM than control and other organic treatments. Incorporation of eupatorium 7.5 t ha⁻¹ recorded significantly higher grain yield of transplanted aromatic rice which was 39.1, 24.5, 8.7, 8.10, 17.7, and 12.7% higher than absolute control, eupatorium 2.5, 5.0 and 10.0 t ha⁻¹ FYM 5 t ha⁻¹ and sunnhemp 2.5 t ha⁻¹ it was par with RDF. Application of eupatorium at higher level improved the rice quality and soil fertility. The residual effect of eupatorium 10 and 7.5 q ha⁻¹ was also more in terms of ratoon crop grain yield net income and NBC ratio as compared to RDF, FYM 5 t ha⁻¹ sunnhemp 2.5 t ha⁻¹ and eupatorium 2.5 t ha⁻¹. The productivity of transplanted ratoon aromatic rice sequence in terms of grain yield and net income was significantly higher with RDF+ FYM over other treatments. Among the organic treatments eupatorium 7.5 t ha⁻¹ recorded significantly higher grain yield and net income which was par with RDF.

In second treatments combined application of eupatorium 7.5 t ha⁻¹ + 50 % RDF showed significantly higher grain yield and net return of transplanted rice which was 5.89 and 4.48% higher compared to RDF alone and was par with RDF + FYM. Integrated use of eupatorium 10 and 7.5 t ha⁻¹ along with 50% RDF also maintained higher soil fertility and rice quality. In ratoon aromatic rice residual effect of eupatorium 10 t ha⁻¹ + 50% RDF and eupatorium 7.5 t ha⁻¹ + 50% RDF showed significantly higher grain yield, net return and NBC ratio than RDF, RDF + FYM and control.

Grain yield and net returns with eupatorium 7.5 t ha^{-1} + 50% RDF was significantly higher than RDF and was on par with RDF + FYM, but, NBC ratio with eupatorium 7.5 t ha^{-1} + 50% was significantly higher than RDF + FYM and par with RDF in transplanted-ratoon aromatic rice sequence.

In aromatic rice, green manuring of eupatorium @ 7.5 t ha^{-1} along with 50% RDF recorded higher productivity, soil fertility, rice quality and income besides saving of 50% RDF.

GENETIC ANALYSES OF MULTIPLE STRESS RESISTANCE IN RELATION TO ADAPTATION IN GROUNDNUT (*ARCHIS HYPOGAEA* L.)

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ABSTRACT

Biotic and abiotic stresses are the major constraints in achieving higher and stable production in groundnut. Genetic solution entails cultivation of multiple stress resistant varieties. Available cultivars are susceptible to most of the stresses. Significant genetic variability existed for resistance to various biotic (late leaf spot, rust, Sclerotium, bud necrosis and Spodoptera) and abiotic (Iron chlorosis) stresses in the germplasm. Correlations indicated scope for selection of multiple resistant germplasm. Several interspecific derivatives, mutants and some advance breeding lines exhibited resistance to more than one stress. But most of the multiple stress resistant genotypes matured late and adapted specifically to kharif season. Early maturing Trombay groundnut stocks with superior agronomic feature had adaptability to both *Kharif* and Summer seasons. But due to their intrinsic susceptibility to most of the stresses, their performance was severely affected during *Kharif*.

Additive Main effects and Multiplication Interaction (AMMI) analysis indicated the predominance of environmental component in the expression of pod, kernel and oil yield. Resistant genotypes, ICGV 87165 and B 37c were specifically suited to *kharif* season. Released cultivars, R 8808 and TAG 24 were specifically adapted to Summer. Foliar disease resistant genotype, D 39d with slight interaction effect was suitable to both *kharif* and Summer seasons.

Twelve crosses were made between large seeded/widely adapted Trombay genotypes and resistant germplasm to combine agronomic superiority with resistance. Depending on the parents used, 2-3 complementary recessive genes governed late leaf spot and rust resistance in the crosses. Further resistance to late leaf spot and rust was independent. Crosses involving Mutant 28-2 were superior for late spot and *Spodoptera* resistance, while those involving D 39d and B 37c for late leaf spot and rust resistance. The parents 28-2 and TG 49 contributed significantly to large seed size.

Germplasm exhibited limited polymorphism with individual biochemical (isozyme and proteins) markers. When, Glutamate Oxaloacetate Transaminase and Proteins (total and seed) were combined together, only 15 genotypes were uniquely fingerprinted revealing a need for use of other biochemical/molecular markers

INFRASTRUCTURE POLICIES FOR PRICE STABILISATION OF POTATO IN KARNATAKA

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ABSTRACT

Karnataka is one of the important potato growing states in India. Primary and secondary data were used in the study. All the markets showed positive and significant growth in arrivals and prices of potato. The area and production of potato showed an increasing trend and productivity showed decreasing trend. The seasonal indices of arrivals and prices of potato showed seasonality in all markets. The market integration model revealed high level of integration between all the markets. The unawareness and non-availability of package of practice books was considerably high among all the farmers. Farmers were satisfied with timely and adequate availability of potato seed tubers in the state. Farmers opined absorption of all the nutrients by first tuber as reason for non uniform tubers while scientist claimed it to genetic nature.

The major lacuna in APMCs was absence of temporary storage facilities and lack of grading and physical facilities in all the markets. In all markets, farmers were satisfied with the transaction facilities. Farmers preferred to sell their produce through commission agents. The NPV BCR IRR and PBP for cold storage and local were found to be financially viable for investments. The net returns to storage for rabi and kharif crop showed that the returns were negative if potato was stored in kharif seasons. The market structure for potato in chikkabalapur market was found to be moderate concentrated. Sri Lanka and UAE are very loyal markers for potato. The NPCs suggest that the Indian potato is uncompetitive in the international market and is not an efficient export crop. The DRC ratio indicated high export competitiveness of potato. Transportation model suggest that the transport of potato between markets must be restricted to Hubli- Belgaum and Kolar-Bangalore.

**A Study on The Nature and Extent of Linkages Between Scientists of
University of Agricultural Sciences, Dharwad and Extension Personnel of
Karnataka State Department of Agriculture in Northern Karnataka**

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ABSTRACT

The study on the nature and extent of linkages between scientists and extension personnel was carried out during 2001-02 in Dharwad, Belgaum, Gulbarga and Bellary districts of northern Karnataka. The data was collected through mailed questionnaire from 102 scientists and 80 extension personnel. A scale to measure the performance of linkage activities by scientists and extension personnel was developed by followed standardized procedure.

The major findings of the study were: majority of the professors (85.71%), assistant professors (82.25%) and associate professors (69.23%) belonged to the medium performance category. Cent per cent of JDA's belonged to high performance category, whereas, majority of ADAs (78.26%) and AOs (75.92%) belonged to medium performance category. Over three fifth of professors (64.28%) participated occasionally in field days. Whereas, majority of associate professors never participated in joint farm trials (77.41%) and diagnostic field visits (69.35%). The occasional participation of ADAs was found to be 52.17 per cent each in demonstration, field days and farm trials. The communication approach used by professors was phone calls regularly (50.00%) and occasionally (50.00%). The study also revealed that more than seventy per cent of AOs never read success stories, research articles, feature articles and newspapers.

Lack of proper feedback on farmers problem from extension personnel was major constraint expressed by majority of the professors (85.71%) and associate professors (84.61%). Diagnostic teams are hardly constituted in many cases as expressed by majority of professors (78.51%) and ADAs (73.91%). Cent per cent of the professors and JDAs suggested strengthening farmers participation in research and extension activities, liaison with private organization and NGOs by both the systems and adequate transportation facilities be made available to participate in extension activities. Whereas, cent per cent of JDAs also suggested for joint participation in the functions such as field testing demonstration for strengthening linkages.

STANDARDIZATION OF PRODUCTION TECHNOLOGY IN AGERATUM (*AGERATUM HOUSTONIANUM* MILL.)

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ABSTRACT

Ageratum is an up coming news potential cut flower crop belonging to the family Asteraceae. In India it is being grown for its attractive cut flowers around big cities which are widely used for interior decoration in vases and also for bouquet making.

In order to standardize the production technology for profitable cultivation of *ageratum* for cut flower production four experiments were conducted at Floriculture Unit, Department of Horticulture, College of Agriculture, UAS, Dharwad during *kharif* and *rabi* seasons of 2001-02.

The nutritional experiment showed that application of 150 kg nitrogen and 125 kg phosphorus per hectare significantly increased the cut flower production as well as growth and yield attributes during both *kharif* and *rabi* seasons. The economics indicated that the realization of maximum net profit with the same nutrient combination. Increased nitrogen and phosphorus application increased the uptake of both the nutrients by plants individually and in combination.

Foliar application of growth regulators (GA_3 , Kinetin and MH) at 30 days after transplanting increased the number of leaves, branches, leaf area, leaf area index and total dry matter production. As a result of these, flower spike yield and quality also increased. Application of GA_3 150 ppm significantly increased flower spike yield and maximum net returns were realized with the application of GA_3 during both *kharif* and *rabi* seasons.

Higher flower spike yield per plant and per hectare were recorded at wider spacings. Plants grown at a spacing of 45 x 20 cm recorded the highest flower spike yield per plant basis whereas, on hectare basis the plants grown at a spacing of 45 x 15 cm recorded the highest flower spike yield.

Vase life studies indicated that, aluminum sulphate or cobalt sulphate at 1.0 mM along with 4 per cent sucrose are best to promote the vase life and quality of *ageratum* cut flowers.

EFFECT OF PLANTING TIME, NUTRITION AND GROWTH REGULATORS ON GROWTH, YIELD AND QUALITY OF TUBEROSE CV. SINGLE

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ABSTRACT

Tuberose (*Polianthes tuberosa* Linn.) is a popular and important bulbous flower crop belonging to the family Amaryllidaceae. It occupies a prime position because of its popularity as cut flower, loose flower and for its potential in perfume industry. In India it is being grown for its attractive cut flowers which are widely used for interior decoration in vases, bouquet making and also loose flowers which have great demand in domestic market of preparation of garlands and venis.

The experiments were conducted, at Department of Horticulture, College of Agriculture UAS, Dharwad during 2000-01, to find out suitable planting time, effect of nutrition and growth regulators on growth and flower production and use of chemical preservatives for prolonging vase life of cut flowers of tuberose.

To obtain increased flower production with high quality in tuberose, April followed by May and March months are the best for planting, though it can be planted from February to August with better yields.

The nutritional experiment showed that application of 50 per cent of the recommended dose of fertilizer along with 3 kg vermicompost per square meter has significantly increased the flower production as well as growth and yield attributes during both seasons. The economics indicated the realization of maximum net profit with the same nutrient combination.

Foliar application of GA₃ to 30 and 60 days after planting increased the plant height, number of leaves, shoots and leaf area. As a result of these, flower spike yield and quality also increased. Application of GA₃ at 150ppm significantly increased spike yield and loose flower yield and maximum net returns were realized.

Vase life studies indicated that, aluminium sulphate and citric acid at 1.0 mM along with 4 per cent sucrose were most effective in enhancing the flower quality and vase life of tuberose.

INTERCROPPING OF LEGUMES IN SORGHUM [SORGHUM BICOLOR {L.} MOENCH]

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ABSTRACT

A field experiment was conducted on medium deep black soil during *Kharif* 2001 to study "Intercropping of grain legumes in sorghum" under rainfed condition at Main Research Station, Dharwad, Karnataka. The experiment was laid out in RCBD with three replications. French bean, cowpea, soybean, blackgram and groundnut were grown as intercrops in 1: 2 row proportion with wider spaced (S2-90cm × 5cm) sorghum genotypes viz., DSH-3 (hybrid) and DSV-2 (variety). Sole sorghum with normal planting geometry (S1-45cm × 10cm) was also included for comparison.

Between sorghum genotypes DSH-3 produced significantly higher grain yield (3,783kg/ha) than DSV-2 (3,493kg/ha). Among the cropping systems, sole sorghum with normal (S1) and wider (S2) planting geometrics recorded higher grain yield (3,854kg/ha and 3,890kg/ha, respectively) then sorghum grain yields intercropped with French bean, soybean and black gram were comparable with sole sorghum. Among the combinations, sole DSH-3 (S2) produced significantly higher grain yield (4,080kg/ha) and was comparable with DSH-3 (S2) intercropped with French bean, soybean and Black gram and DSV-2 (S2) intercropped with soybean.

Among different inter crops, significantly higher grain yield (1,175kg/ha) was recorded by soybean intercropped with DSV-2 (S2), followed by soybean intercropped with DSH-3 (S2) and French bean intercropped with DSV-2 (S2).

Sorghum equivalent yield was significantly higher in sorghum + French bean (6,419kg/ha), followed by sorghum + soybean (5,874kg/ha). Among the combinations, DSH-3 (S2) + French bean recorded significantly higher equivalent yield (6,673 kg/ha) and was on par with DSH-3 (S2) + soybean and DSV-2 (S2) + French bean combinations.

The economics analysis of the system revealed that intercropping of sorghum + French bean or soybean recorded significantly higher net returns and B: C ratio than other cropping systems. Among the combinations, significantly higher net returns and B: C ratio were recorded in DSV-2 (S2) + French bean (Rs. 22, 426/ha and 2.16) and DSV-2 (S2) + soybean (Rs. 21,063/ha 2.22), respectively than other cropping syst

FODDER YIELDING POTENTIALITY AND ENSILING ABILITY OF POP SORGHUM [*SORGHUM BICOLOR* (L.) MOENCH] GENOTYPES UNDER NITROGEN AND SEED RATE LEVELS

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ABSTRACT

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad, on medium deep black clay soils during *kharif* 2001 to study the effect on nitrogen and seed rate levels on forage yield, quality and ensiling ability of pop sorghum. There were 12 treatment combinations involving genotypes (two), nitrogen (three) and seed rate (two) level and one check (SSV-74) and the experiment was laid out in randomised complete block design with three replications.

Pop sorghum genotype Pudakalakatti-1 recorded significantly higher green fodder yield (35.16 t ha^{-1}) compared to Shiggaon-3. The green fodder yield between pop sorghum genotypes and check SSV-74 was non significant. The fodder quality was not superior in pop sorghum genotypes.

Significantly higher green fodder yield of 36.41 t ha^{-1} was recorded with the application of 75 kg N ha^{-1} and was on par with 95 kg N ha^{-1} . Higher level of N increased the quality of fodder.

Seed rate of 20 kg ha^{-1} produced significantly higher green fodder yield (35.04 t ha^{-1}) compared to 25 kg ha^{-1} . The quality parameters did not differ significantly with seed rates.

Significantly higher interaction was observed for green forage yield (40.24 t ha^{-1}) in Pudakalakatti-1 at $20 \text{ kg seeds ha}^{-1}$ supplied with 75 kg N ha^{-1} .

Check SSV-74 recorded significantly higher brix, palatability and silage quality compared to pop sorghum genotypes.

Based on the study, it can be concluded that Pudakalakatti-1 at $20 \text{ kg seeds ha}^{-1}$ along with 75 kg N ha^{-1} was significantly superior with respect to monetary returns (Rs. 11,105 ha^{-1} net returns and 1.59 B:C ratio).

BIO-EFFICACY OF CLOMAZONE HERBICIDE FOR WEED MANAGEMENT IN SOYBEAN [*GLYCINE MAX* (L.) MERRILL]

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ABSTRACT

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad on vertisols during *kharif* 2001 to study the bio-efficacy of clomazone herbicide for weed management in soybean. The experiment was laid out in randomized block design with 12 treatments comprising of pre-emergence (PE) application of clomazone @ 625, 750, 875 and 1000 g a.i.ha⁻¹, clomazone @ 500 g a.i.ha⁻¹+chlorimuron @ 9 g a.i.ha⁻¹, clomazone @ 500 g a.i.ha⁻¹+ metribuzin @ 250 g.a.i.ha⁻¹, alachlor @ 2500 g a.i.ha⁻¹, pendimethalin @ 1000 g.a.i.ha⁻¹, chlorimuron @ 9 a.i.ha⁻¹, one hand weeding + one intercultivation, weed free and weedy checks. The treatments were replicated thrice.

Clomazone did not cause any phytotoxicity on soybean. Clomazone @ 750 to 1000 g a.i.ha⁻¹ applied as PE were found effective in reducing both population and dry weight of weeds. These treatments also recorded higher weed control efficiencies.

There was improvement in growth and yield components of soybean with the application of clomazone. Clomazone @ 750 to 1000 g a.i. ha⁻¹ recorded significantly higher seed yield as compared to clomazone @ 625 g a.i.ha⁻¹. Weedy check recorded significantly lower seed yield. Application of clomazone @ 750 to 1000 g a.i. ha⁻¹ also recorded significantly higher nutrients uptake by crop compared to clomazone @ 625 a.i.ha⁻¹ and pendimethalin @ 1000 g a.i.ha⁻¹ and vice-versa with uptake of nutrients by weeds.

Significantly higher net return and B: C ratios were realized with clomazone @ 750 g a.i.ha⁻¹ compared to clomazone @ 625 g a.i.ha⁻¹, alachlor @ 2500 g a.i.ha⁻¹, pendimethalin @ 1000 g a.i.ha⁻¹ and chlorimuron @ g a.i.ha⁻¹.

Application of clomazone @ 625 to 1000 g a.i.ha⁻¹ had no adverse effect on urease, dehydrogenase and phosphatase activities at 20 days after sowing and also on succeeding crops.

RESPONSE OF BLACK GRAM (*VIGNA MUNGO* L.) GENOTYPES TO DATES OF SOWING AND PHOSPHORUS LEVELS IN NORTHERN TRANSITIONAL TRACT OF KARNATAKA

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ABSTRACT

A field experiment entitled "Response of blackgram genotypes to dates of sowing and phosphorus levels" was conducted at Main Research Station, University of Agricultural Sciences, Dharwad during kharif, 2001. Experiment was laid out in a randomized complete block design with factorial concept. There were 18 treatment combinations consisting of three blackgram genotypes (TAU-1, Manikya and K-3), three dates of sowing (16th June, 1st July and 16th July) and two phosphorus levels (50 kg and 75 kg P₂O₅ ha⁻¹). Experiment was conducted in medium black soil with a pH of 7.6 under rainfed condition.

The blackgram genotype, TAU-1 registered significantly higher seed yield (845.21 kg ha⁻¹) over Manikya (765.86 kg ha⁻¹) and K-3 (690.77 kg ha⁻¹). Maximum seed yield of blackgram was obtained when sown on 16th June (1068.87 kg ha⁻¹) followed by 1st July (741.93 kg ha⁻¹) and 16th July (491.24 kg ha⁻¹). No significant difference was observed in seed yield between 50 kg and 75 kg P₂O₅ ha⁻¹. None of the interaction effects were found significant.

Blackgram genotype, TAU-1 recorded higher N and P uptake (54.47 and 9.44 kg ha⁻¹, respectively) over Manikya and K-3. The crop sown on 16th June registered significantly higher N and P uptake (64.14 kg ha⁻¹ and 11.29 kg ha⁻¹). Compared to other sowing dates. No significant difference was observed in N and P uptake between 50 kg or 75 kg P₂O₅ ha⁻¹. All the interaction effects were not found significant.

Blackgram genotype, TAU-1 sown early on 16th June with 50 kg P₂O₅ ha⁻¹ recorded maximum net returns of Rs. 17,007 ha⁻¹ and B:C ratio of 3.34.

YIELD MAXIMISATION OF RABIN BLACKGRAM (*Vigna mungo* (L.) Hepper) Cv. T A U THROUGH CONJUNCTIVE USE OF ORGANIC AND INORGANIC SOURCES OF NUTRIENTS

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ABSTRACT

A field experiment was conducted at Agricultural College Farm Raichur during rabi 2001 to study the response of black gram (*Vigna mungo* (L.) Hepper) to twelve combinations comprising of four sources of organic manure and three levels of fertilizers. The treatments were laid out in a factorial Randomized Block Design.

Application of vermicompost recorded significantly higher grain yield (11.89 q ha^{-1}) as compared to application of poultry manure (10.06 q ha^{-1}) and control (9.33 q ha^{-1}) and was on par with the application of poultry manure (11.52 q ha^{-1}). While, the application of 125 percent RDF recorded significantly higher grain yield (12.47 q ha^{-1}) over 100 percent (8.47 q ha^{-1}) and 150 percent (11.21 q ha^{-1}). This increase with vermicompost among organics and 125 percent RDF among fertilizers application was mainly attributed to significantly higher yield components viz., number of grains per pod, number of pods per plant, number of grains per plant and grain weight per plant.

The combined application of 125 percent RDF and poultry manure gave significantly higher yield (14.12 q ha^{-1}) over the remaining treatments either in combination or individually. This most superior combination resulted in better nutrient uptake, which ultimately laid to quality improved (24% protein) as compared to the remaining treatment combinations.

Significantly higher net returns ($\text{Rs}15158 \text{ ha}^{-1}$) and BC ratio (1.782) were recorded with poultry manure application over other organic manure treatments. Among fertilizer levels application of 125 percent RDF was found significantly superior with higher net returns ($\text{Rs. } 16015 \text{ ha}^{-1}$) and BC ratio (1.734) than other fertilizer levels. Among the varying combinations 125 RDF with poultry manure recorded significantly the highest net returns ($\text{Rs. } 20337 \text{ ha}^{-1}$) and BCV ratio (2.375) over the remaining combinations.

EFFECT OF DIFFERENT LEVELS OF NPK FERTILIZATION ON GROWTH, YIELD AND QUALITY OF MALT BARLEY (*HORDEUM VULGARE* L.)

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ABSTRACT

A field experiment was conducted to study the “effect of different levels of NPK fertilization on growth, yield and quality of malt barley (*Hordeum vulgare* L.)”, at Research and Development Farm, Ugar Sugar Works Limited, Ugar Khurd, Belgaum district during rabi, 2001-02. the experiment was laid out in randomised block design (three factor) with three replications.

The highest total dry matter production (107.14 g/0.5 m row length), DM accumulation in leaves (26.92 g/ 0.5 m row length) and ear head (38.01 g/0.5 m row length) was observe due to application of 100 kg N ha⁻¹ at 90 DAS. Application of N @ 100 kg ha⁻¹ also accounted for maximum LAI at 90 DAS (2.65).

Grain and straw yield was highest (46.53 and 67.45 q ha⁻¹) with the application of 100 kg N ha⁻¹ and was at par with that of 80 kg N ha⁻¹ (43.44 and 66.62 q ha⁻¹). Application of 100 kg N ha⁻¹ recorded maximum protein per cent in grains (10.81%), α -amylase activity (59.62 mg/g of maltose), husk percentage (9.53%) and germinative energy at 48 and 72 hours (95.51 and 99.33) and highest uptake of NPK (79.96, 23.12 and 202.42 NPK kg ha⁻¹), highest net returns (Rs. 26,167 ha⁻¹) were recorded with application of 100 kg N ha⁻¹ and was at par with that of 80 kg N ha⁻¹.

Application of 60 kg P₂O₅ ha⁻¹ recorded significantly higher total dry matter production (97.59 g/0.5 m row length) and LAI (2.41) over 30 kg P₂O₅ ha⁻¹. Grain and straw yield was significantly higher (40.34 and 63.43 q ha⁻¹) with the application of 60 kg P₂O₅ ha⁻¹ over 30 kg P₂O₅ ha⁻¹.

Protein content in grains, α -amylase activity, husk percentage and germinative energy at 48 and 72 hours were significantly higher with the application of 60 kg P₂O₅ ha⁻¹ over 30 kg P₂O₅ ha⁻¹. highest net returns (Rs. 21,611 ha⁻¹) were recorded with application of 60 kg P₂O₅ ha⁻¹.

Application of potassium did not show significant effect on the overall performance of the crop. the interaction effects were found to be non-significant for all the variables. to obtain higher yield, as well as malt quality, fertilizer dose of 80:30:20 NPK kg ha⁻¹ can be recommended, which is economically viable.

WHEAT RESIDUE MANAGEMENT PRACTICES AND MANURIAL TREATMENTS ON SOYBEAN IN SOYBEAN – WHEAT SYSTEM

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ABSTRACT

Field experiment was conducted at the Agricultural College Farm, Dharwad, during *Kharif* 2001 to study the effect of wheat residue management practices and manorial treatments on soybean in soybean in soybean-wheat system on vertisols. The treatments composed of wheat residue management practices viz., residues only, stubbles+residues, stubbles only, stubbles burnt and no residues along with manorial treatments viz., RDF, RDF+FYM @ 7.5 t/ha, 50% RDF, 50% RDF+FYM @ 7.5 t/ha and control. The experiment was laid out in a split-plot design with three replications.

Application of RDF+FYM @ 7.5 t/ha recorded significantly higher seed yield (2545 kg/ha) and stover yield (4472 kg/ha) of soybean. Similarly, it also showed significant improvement in yield component viz., number of pods per plant, number of seeds per plant and seed weight per plant as compared to application of RDF. The next best treatment was 50% RDF+FYM @ 7.5 t/ha, which was found on par with RDF. The growth parameters, nutrient uptake, nutrient availability and microbial population were significantly higher with the application of RDF + FYM @ 7.5 t/ha over RDF. Whereas, wheat residue management practices did not show any significant impact on the growth parameters, yield components, nutrient uptake, nutrient availability and microbial count. Application of RDF+FYM @ 7.5 t/ha over rest of the treatments. Application of stubbles burnt+RDF+FYM @ 7.5 t/ha noticed significantly higher net returns (Rs. 17,189/ha) compared to stubbles burnt+RDF (Rs. 13,598/ha). B:C ratio was found significantly higher with stubbles burnt + RDF+FYM @ 7.5 t/ha (2.96) over rest of the treatments.

Application of RDF+FYM @ 7.5 t/ha recorded significantly higher seed yield (2545 kg/ha) over rest of the treatments and was 21% higher over RDF. Further, application of RDF+FYM with residues and stubbles incorporation recorded significantly higher net returns (Rs. 15,441 /ha and 16,139/ha, respectively) and B:C ratio (2.25 and 2.84, respectively).

INTEGRATED WEED MANAGEMENT IN GROUNDNUT (ARACHIS HYPOGAEA L.) AND SUNFLOWER (HELIANTHUS ANNUUS L.) INTERCROPPING SYSTEM.

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ABSTRACT

A field experiment was conducted at the Agricultural College Farm, Raichur during kharif season of 2001-02 to study the weed management in groundnut and sunflower intercropping system. There were 15 treatments combinations and the experiment was laid out in Randomized complete Block Design with three replications.

Weed control treatments differed significantly for weed population and dry weight of weeds. The treatment which received application of pendimethalin 1.0 ka a.i. ha⁻¹ supplemented with one IC and one HW recorded significantly lower weed population and weed dry weight next only to weed free check.

At all the crop growth stages, the plant height, number of leaves, number of branches per plant were significantly higher in weed free check but was on par with T₉, T₁₂, T₁₁ and T₁₀.

Pre – emergence application of pendimethalin combined with one IC and one HW resulted in highest pos yield (12.00 q/ha) and seed yield (6.30 q/ha) and was on par with weed free check, T₁₂, T₁₁ and T₁₀. The significantly higher pod and seed yield under weed control treatments was mainly attributed to the absence of weed competition for growth resources especially for moisture, nutrient and light. The remaining treatments which received the application of herbicides combined with two IC (T₅ to T₈), herbicides alone (T₁ to T₄) and farmers practice (T₁₅) were on par with each other. The maximum net income was obtained with weed free check (Rs. 12787/ha) followed by trifluralin (Rs.12122/ha) and pendimethalin (Rs.11966/ha) each combined with one IC and one HW. Combination of trifluralin with one IC and one HW recorded the highest BC ratio (1.32) compared to pendimethalin.

PERFORMANCE OF PERENNIAL SESBANIA SPECIES AS INFLUENCED BY MANAGEMENT PRACTICES UNDER IRRIGATION

C.R. Chandrashekhar

Major Advisor; Dr.B.K.Desai

Field and pot culture experiments were conducted at Agricultural College Farm, Raichur during 2000-2002 to study the "Performance of perennial Sesbania species as influenced by management practices 14579 to 21275 ha⁻¹) and B:C (1.95 to 2.39) and were superior to other pulses used in the study.

In the study on response of rajmash genotypes to planting geometry, Contender recorded significantly higher seed yield (1482kg ha⁻¹) followed by HPR-35 (1462 kg ha⁻¹). Both were on par with each other whereas lower seed yield was noticed with Arka Komal (138 kg ha⁻¹) and waghya (1297kg ha⁻¹). The genotype HPR-35 recorded significantly higher protein content and protein yield (21.71% and 326 kg ha⁻¹, respectively) followed by Waghya and Contender. The nitrogen uptake was higher in HPR-35 and Waghya (84.96 and 71.97kg ha⁻¹ respectively).

Among the planning geometries, 30x10 cm recorded significantly higher yield (1584 kg ha⁻¹) followed by 45 cmx10cm spacing (1541kg ha⁻¹). Similar trend was observed in the protein content, protein yield and nutrients uptake.

Among the genotypes Contender with 30cmx10cm spacing (3.33x10⁵ plants ha⁻¹) recorded higher gross returns, net returns and B:C ratio (Rs 34,300/- ha⁻¹ 19,002 ha⁻¹ and 2.24, respectively) closely followed by Contender with 45cmx10cm spacing (2.22x10⁵ plant ha⁻¹) (Rs.33,313, 19,265 and 2.34, respectively) which were on par with each other. HPR-35 with similar spacings was next in the order (net returns of Rs.17,675 and 17,892 ha⁻¹ and B:C ratio of 2.15 and 2.67, respectively).

Thus, Contender and HPR-35 could be grown economically at a spacing of 45cmx10cm during kharif in the Northern Transitional Zone of Karnataka.

PHYSIOLOGICAL APPROACHES ON WEED CONTROL EFFICIENCY IN RADISH [RAPHANUS SATIVUS (L.)]

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ABSTRACT

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad during summer 2002 to study the seed control efficiency in radish (Cv. Pusa Chetaki). The experiment consisted of ten herbicide treatments with weed free and unweeded control and was laid out in randomized block design with three replications.

Results revealed that the application of chlorimeton was phytotoxic while, butachlor @ 1.5 kg a.i. ha⁻¹ was not phototoxic. The monocot, dicot and total number of weed and total dry weight of weeds were found to be maximum in unweeded control and the herbicide treatment butachlor @ 1.5 kg a.i. ha⁻¹ and alachlor @ 1.5 a.i. ha⁻¹ decreased these parameters. The weed control efficiency was maximum with butachlor @ 1.5 kg a.i. ha⁻¹.

The morpho-physiological traits viz., leaf dry weight, root dry weight and total dry weight were lowest in unweeded control and the application of butachlor @ 1.5 kg a.i. ha⁻¹ and alachlor @ 1.5 kg a.i. ha⁻¹ increased these parameters. The growth parameters viz., leaf area, RGR, CGR, NAR, AGR, SLW, LAD and BMD were significantly lower in unweeded control and application of butachlor @ 1.5 kg a.i. ha⁻¹ was very effective and increased these parameters.

The root yield decreased significantly due to weed competition and among the herbicides, root yield was significantly higher in butachlor @ 1.5 kg a.i. ha⁻¹ followed by alachlor @ 1.5 a.i. ha⁻¹ and these treatments recorded significantly lower values for weed index. The total chlorophyll content was lower in clomozone @ 0.75 kg a.i. ha⁻¹ followed by unweeded control. Nitrate reductase activity was significantly lower in unweeded control and the application of butachlor @ 1.5 a.i. ha⁻¹ significantly increased chlorophyll content and NR activity. The benefit: cost ratio was highest with butachlor @ 1.5 kg a.i. ha⁻¹ followed by alachlor @ 1.5 kg a.i. ha⁻¹.

PHYSIOLOGICAL AND BIOCHEMICAL BASIS OF RESISTANCE TO POWDERY MILDEW OF GREENGRAM [VIGNA RADIATA (L.) WILZEK.]

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ABSTRACT

An experiment was carried out to find out the influence of powdery mildew caused by *Erysiphe polygoni* DC on various morphological, physiological and biochemical parameters and partitioning efficiency in greengram genotypes, at Main Research Station, College of Agriculture, University of Agricultural Sciences, Dharwad, during *Kharif* 2001.

The experiment consisted of twelve treatment combinations comprising six genotypes in three replications, raised under protected and unprotected conditions. There was a natural incidence of the disease at 30 DAS (due to favorable weather conditions). The plants under protected treatments were sprayed with carbendazium for protection against the powdery mildew disease.

Results revealed that powdery mildew caused a significant reduction in plant height, number of primary branches, leaf area and growth parameters viz., LAI, LAD, dry matter accumulation and dry matter partitioning under diseased conditions. Yield and yield components were also affected due to the disease. The extent of reduction was least in the genotype TARM-18 compared to others.

Bio-chemical parameters such as chlorophyll (a, b and total) reduced significantly under protected condition, whereas the level of sugars, phenols, tannins and nitrate reductase activity was more under unprotected conditions. Seed protein content was also significantly reduced by powdery mildew. Yield was significantly and positively associated with pod length and number of seeds per pod under both healthy and diseased conditions.

Thus, it could be inferred from the present investigation that, powdery mildew in greengram brings about considerable changes in the genotypes varying in their reaction to the disease and also manifests the changes in morphological, physiological and biochemical parameters which altogether influence the source sink relationship and the same is expressed in differences in yielding ability of genotypes under protected and unprotected conditions.

INTERCROPPING STUDIES IN PIGEONPEA [CAJANUS CAJAN (L.) MILLSP.] WITH SHORT DURATION PULSES AND OIL SEEDS

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ABSTRACT

A field experiment was conducted on black clayey soil at Main Research Station Dharwad during *kharif* 2001 to study the effect of intercrops and row proportions on growth and yield of pigeonpea. Sixteen treatment combination involving two row proportions of pigeonpea and intercrops in 1:2 and 1:3 and seven intercrops viz., greengram, blackgram, soybean, groundnut, French bean, cowpea and sesame with pigeonpea and sole crops of pigeonpea (90 cm x 30 cm and 120 cm x 22.5 cm) were laidout in a randomized complete block design using three replications.

Cropping systems influenced the grain yield of pigeonpea significantly. Growing of pigeonpea as sole crop with normal planting geometry (90 cm x 30 cm) and wider planting geometry (120 cm x 22.5 cm) recorded higher grain yield of 1543 kg ha⁻¹ and 1447 kg ha⁻¹ respectively over pigeonpea in intercropping system. Further, sole pigeonpea recorded significantly higher yield components viz., number of pods per plant and seed yield per plant as compared to intercropped pigeonpea.

Among the intercropping system, higher grain yield of pigeonpea was recorded when pigeonpea intercropped with all legumes except cowpea and sesame. Among the intercrops, groundnut performed better followed by soybean and French bean.

The total protein yield of the intercropping system was higher in pigeonpea + soybean in 1:3 row proportion (660.96 kg ha⁻¹) followed by pigeonpea + soybean 1:2 row proportion (636.96 kg ha⁻¹) and pigeonpea + groundnut in 1:3 row proportion (616.46 kg ha⁻¹).

The economics of the cropping system reveals that growing of groundnut and French bean as intercrop in pigeonpea (2:1) resulted in maximum net returns (Rs. 23891 and Rs. 23404 ha⁻¹) and B:C ratio (2.89 and 3.07 respectively).

PRODUCTION POTENTIAL OF RAJMASH (*PHASEOLUS VULGARIS* L.) GENOTYPES AND THEIR RESPONSE TO PLANTING GEOMETRY

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ABSTRACT

Two field experiments were conducted on black soils during *kharif* 2001. to evaluate the production potential of *rajmash* (*Phaseolus vulgaris* L.) genotypes in comparison to *kharif* pulses at Main Research Station, Dharwad, Karnataka during 2001 using a randomized block design with three replications.

Among the *kharif* pulses *rajmash* genotypes were the next best after soybean (2027 kg ha⁻¹) in terms of yield with a yield range of 1493 to 1828 kg ha⁻¹. Blackgram and greengram were intermediate while, redgram and peas recorded lower yields. *Rajmash* genotypes recorded higher shelling percentage (51.67-64.47%). net returns (Rs. 14579 to 21275 ha⁻¹) and B: C ratios (1.95 to 2.39) and were superior to other pulses used in the study.

In the study on response of *rajmash* genotypes to planting geometry, Contender recorded significantly higher seed yield (1482 kg ha⁻¹) followed by HPR-35 (1462 kg ha⁻¹). Both were on par with each other whereas, lower seed yield was noticed with Arka komal (1378 kg ha⁻¹) and Waghya (1297 kg ha⁻¹). The genotype HPR-35 recorded significantly higher protein content and protein yield (21.71 % and 326 kg ha⁻¹ respectively) followed by Waghya and Contender. The nitrogen uptake was higher in HPR-35 and Waghya (84.96 and 71.97 kg ⁻¹, respectively).

Among the planting geometries, 30 cm x 10 cm recorded significantly higher seed yield (1584 kg ha⁻¹) followed by 45 cm x 10 cm spacing (1541 kg ha⁻¹). Similar trend was observed in the protein content, protein yield and nutrients uptake.

Among the genotypes Contender with 30 cm x 10 cm spacing (3.33 x 10⁵ plants ha⁻¹) recorded higher gross returns, net returns and B: C ratio (Rs. 34,300/ha⁻¹, 19,002/- ha⁻¹ and 2.24. respectively) closely followed by Contender with 45 cm x 10 cm spacing (2.22 x 10⁵ plants ha⁻¹) (Rs.33, 313/-, 19, 265/- and 2.34, respectively) which were on par with each other. HPR-35 with similar spacings was next in the order (net returns of RS.17, 675/- and 17,892/- ha⁻¹ and B: C ratio of 2.15 and 2.67, respectively).

Thus Contender and HPR-35 could be grown economically at a spacing of 45 cm x 10 cm during *kharif* in the Northern Transitional Zone of Karnataka.

PHYSIOLOGICAL INVESTIGATION IN COMPACT COTTON GENOTYPES UNDER DIFFERENT PLANT POPULATION DENSITIES

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ABSTRACT

A filed experiment was conducted during 2001-02 under rainfed and irrigation condition at the Agricultural Research Station, Dharwad to study the performance of compact cotton genotype under different plant population densities. The experiment consisted 4 genotypes with three spacing in a spilt plot design with three replications on medium black soil under rainfed and irrigated conditions. Compact cotton genotypes were selected based on growth and morphological characters like height, number of leaves, number of nodes, sympodia and monopodia.

Among the genotypes RACH-116 produced significantly higher seed cotton yield (981.6 kg/ha) under rainfed condition in spacing 60x15 cm and 1948.7 kg/ha under irrigated conditions in spacing 60x25. This was mainly attributed to its close association with yield components such as number of bolls / m² (r=0.745) and harvest index (r=0.860).

Genotypes showed significant differences in their growth pattern, morphological characters and phonological characters. Among the genotypes RACH-116 possessed higher dry matter at all the stages mainly because of higher AGR, NAR and leaf area index as compared to other genotypes under both the situation studies indicated highly significant positive association of yield with TDM (r=0.863), boll weight (r=0.909) and number of bolls/plant (r=0.745). Among the genotypes RACH-11-8 was comparatively early in phonological characters. However, the spacing did not influenced the phonology. The genotype RACH-116 recorded highest stem diameter.

PHYSIOLOGICAL STUDIES IN SAFFLOWER (*CARTHAMUS TINCTORIUS* L.) GENOTYPES OF VARYING PLANT TYPES

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ABSTRACT

A field experiment was conducted during *rabi*, 2001-02 at Main Research Station, University of Agricultural Sciences, Dharwad to evaluate the newly developed safflower genotypes of varying plant types for their morpho-physiological, biochemical and yield potentials.

The genotypes differed significantly with respect to various morpho-physiological characters. The genotypes 98-202 and 98-63 recorded higher plant height. Among the genotypes 98-102 and check A₁ recorded maximum number of primary and secondary branches as well as capsules per plant. The genotypes 98-102 and check A₁ recorded the maximum leaf, stem, capsule and total dry matter content besides recording higher seed yield.

Among the genotypes, 89-102, check A₁ and 98-51 recorded not only maximum leaf area and leaf area index at 90 DAS but also recorded higher growth parameters viz., AGR, CGR, RGR and NAR, which increased upto 60-90 DAS and decreased thereafter in all the genotypes also. The genotypes 98-102 (27.00), 98-3 (25.04) and check A₁ (22.76) and check A₂ had lower seed yield. It was also observed that the grain yield had positive and significant association with number of capsules per plant, harvest index and test weight. Whereas, it was negatively associated with number of seeds per capsules and oil content. The maximum epicuticular wax content observed in the genotypes 98-101 and 98-51, whereas, 98-202 and 98-76 among the genotypes and it was higher in 98-64 (30.30%) followed by 98-49 (29.22%) whereas, lowest oil content was observed in 98-102 (27.13%) and 98-97 (22.13%). It may be concluded that the genotypes 98-102, check A₁, 98-3, 98-51 and 98-43 exhibited better field performance in terms of their developmental pattern, growth parameter and yield.

GENETIC ANALYSIS IN BREAD WHEAT (*TRITICUM AESTIVUM* L.) FOR YIELD, YIELD ATTRIBUTING TRAITS AND DISEASE RESISTANCE

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ABSTRACT

The study was conducted on 36 crosses derived from twelve bread wheat genotypes, six lines and six testers in line x tester (L x T) fashion during *rabi* 2001 at wheat Improvement Project, U.A.S., Dharwad, to investigate the nature of gene action, extent of heterosis and inbreeding depression, variability, inter-character correlation between grain yield and yield components and mechanism of rust resistance.

There was highly significant variability in the performance of the genotypes. Most of the crosses exhibited significant heterosis over their respective parents. The combining ability analysis indicated the predominance of non additive gene action in the inheritance of all the characters studied except plant height and peduncle length. In all the F₂ progenies, there was high genotypic as well as phenotypic variability coupled with high heritability. The genetic advance in most of the characters was quite high.

Correlation study clearly indicated that there was significant interaction between yield components such as days to flowering and maturity, biomass, tillering capacity and number of grains per spike and grain yield. Biomass, harvest index, days to flowering and plant height imparted direct influence on grain yield. The remaining traits affected grain yield indirectly mainly via biomass production. Quite high coefficient of determination (94%) indicated that grain yield was almost exclusively dependent on the component characters included in this study.

The testers contributed to the rust resistance of the genotypes much more than the lines did. Histo-pathological analysis indicated that there was strong positive correlation between leaf morpho-physiological structures (thickness and number of epidermal cells, laminar thickness, etc) and disease resistance.

GENETIC ANALYSIS OF TETRAPLOID WHEAT FOR YIELD, YIELD ATTRIBUTING TRAITS, QUALITY AND DISEASE RESISTANCE

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ABSTRACT

A study was undertaken during 2001-2002 rabi season in Wheat Improvement Project Field, U.A.S., Dharwad, on twelve parents, their F_1 s and F_2 s, to investigate the gene action, extent of heterosis and inbreeding depression and correlation between yield and yield attributing traits. The base material include five lines NIDW-15, Bijaga yellow, Vijay, DDK-1001 and MACS-2846 and seven testers NP-200, DWR-185, DWR-1006, MACS-3125, MACS-1967, DWR-2006 and Raj-1555. Parents, F_1 s and F_2 s were grown in randomized block design with two replications.

There was significant difference between parents as well as hybrids for all characters studied. Significant heterosis was observed for yield, yield attributing traits and quality. On the other hand, the percent inbreeding depression from F_1 to F_2 was negligible in all the cases.

Analysis of variance for combining ability revealed that both GCA and SCA variances were important for all characters. The result also showed the predominance of additive gene action.

Correlation result revealed the correlation of yield-attributing traits like spike length, number of tillers/plant, number of spikes / m^2 and biomass with yield was positive and significant. Spike length, peduncle length, number of spikes/ m^2 and tillers / plant also showed positive direct effect on yield. Most of the characters showed high indirect positive effect via spike length and number of tillers/plant. Plant height, followed by number of tillers / plant and total biomass exerted the high indirect effect through spike length.

The estimation of variability in selected segregating generation showed the presence of moderate to high PCV and GCV. The amount of genetic advancement was also estimated and high genetic gain was found for those characters with moderate to high heritability.

COMBINING ABILITY AND HETEROSIS STUDIES FOR GRAIN YIELD, ITS COMPONENTS AND SHOOT FLY TOLERANCE IN *RABI* SORGHUM

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ABSTRACT

The study was conducted to assess the magnitude of heterosis and combining ability in respect of grain yield and its components in rabi sorghum. The line x tester material involving 33 hybrids, 14 parents and two commercial checks (CSH-15R and CSH-19R) were planted in a lattice square design during rabi seasons of 2001-02 at Regional Research Station, Bijapur. Apart from this investigation was also aimed at identification of resistant genotypes for shoot fly.

Hybrids showed highly significant differences for all the characters studied. Significant and standard heterosis in desirable direction was recorded by several crosses. The present study revealed the direct relationship between sca effects, heterosis and per se performance of hybrids for several characters. Among the hybrids studied, 116A x Muddihalli jola and M31-2A x Muddihalli jola were found to be the best cross combinations for grain yield and its components and for shoot fly tolerance M31-2A x GRS-1 and M31-2A x Madbhavi local were promising.

Analysis of combining ability variance revealed that most of the characters are governed by non-additive gene action except days to 50 per cent flowering yield per plant and per cent dead heart.

The parents 116A, Muddihalli jola and BRJ-356 were the best general combiners for grain yield and other important yield attributing characters. Whereas, M31-2A, 42A, Madbhavi local, Muddihalli jola and M35-1 were the best general combiners for shoot fly resistance.

High sca effects were recorded by hybrids viz., 116A x Muddihalli jola, 42A x GRS-1 and 116A x RS-615 for grain yield and for shoot fly resistance the hybrids viz., 116A x RSLG-262 and 116A x Muddihalli jola recorded high sca effects.

GENETIC STUDIES ON POTENTIALITY OF HERBACEUM COTTON GENOTYPES IN DIVERSE SITUATION

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ABSTRACT

HERBACEUM genotypes were evaluated in intensive protective and rainfed situations. This evaluation was done at Raichur and Dharwad, involving the set of 43 genotypes belonging of *Gossypium hirsutum* G. *herbaceum* and intra-hirsutum hybrids. The three different environmental situation included viz., E₁ (intensive management situation at Raichur) E₂ (protective management situation at Raichur) and E₃ (rainfed situation at Dharwad). The detailed objectives covered evaluation of genetic variability among herbaceum genotypes comparison of species association analysis, path coefficient analysis, path of productivity analysis in different environments and estimating stability parameters.

The herbaceum genotypes showed significant variability for almost all the characters studied. High variability, heritability and GAM were observed for seed cotton yield per hectare, number of bolls and number of monopodia.

Comparison of genotypes of different species revealed very high potentially and response of herbaceum genotypes to intensive and protective management. The herbaceum varieties GH-18 VC H-104 and RAHS-129 recorded highest seed cotton yield in intensive protective and rainfed situations respectively. Stability analysis for seed cotton yield revealed that the herbaceum varieties RAHS-131 and RAHS-129 were most stable and suitable for cultivation in diverse situations.

The path of productivity analysis indicated that the existence of genetic diversity among potential genotypes with respect to traits contributing to high productivity and this information was used in identifying parents for hybridization.

Correlation studies indicated strong positive association of seeds cotton yield with plant height, number of sympodia and number of bolls in both intensive and protective and with ten boll weight and halo length in rainfed situations. The path coefficient analysis indicated direct positive contribution by number of sympodia, plant height and halo length in intensive number of bolls and seed index in protective and plant height length of sympodia and ten boll weight in rainfed situations.

EVALUATION OF LOCAL GREENGRAM (*VIGNA RADIATA* (L.) WILCZEK) GENOTYPES FOR POWDERY MILDEW RESISTANCE, YIELD AND FILED COMPONENTS

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ABSTRACT

Eighty five local germplasm collections were evaluated for seed yield, yield components, disease reaction, pod shattering and bruchid resistance during kharif and summer seasons of 2001-2002 on the experimental field of AICRP on MULLaRP, M.R.S., U.A.S., Dharwad. Highly significant variability among the genotypes was observed for all the characters studied in both the seasons.

In kharif, only one genotype GG-45 was found to be significantly superior for seed yield compared to check. However it was susceptible to powdery mildew, bruchid, yellow mosaic virus (YMV) and pod shattering. Only two genotypes viz., GG_54 and GG-76 were found to be highly resistant to powdery mildew, while 8 genotypes showed bruchid resistance. In summer the yield levels were very low and only six genotypes recorded significantly superior yield over the best check and most of them were susceptible to YMV and pod shattering. The genotypes GG-41 and GG-42 were resistant to YMV.

The traits such as seed yield, pods per plant and pods per cluster recorded moderate GCV and PCV values in kharif season. High heritability was observed for pod length and plant height in kharif. Moderate heritability was observed for plant height, number of pods per plant and seeds per pod in summer. Test weight recorded high heritability values in both the seasons.

Seed yield showed significantly positive association with number of pods per plant, seeds per pod, pod length and number of pods per cluster in both seasons. Pods per plant exerted maximum direct effect on seed yield followed by number of pods per cluster in both the seasons.

Seed size was studied in three F₂ population of diverse crosses. The high heritability coupled with high generic advance over mean for seed size indicates existence of additive gene action. The cross, DLGG-11 x DLGG-1 showed transgressive segregation for test weight with six genotypes showing higher value than the bold seeded parent.

STUDIES ON IN VITRO REGENERATION IN CHICKPEA (*CICER ARIETINUM* L.)

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ABSTRACT

Experiments were conducted to standardize the protocol for in vitro regeneration in chickpea (*Cicer arietinum* L.) three popular cultivars including two desi types, Annigeri and ICCV-10 and a kabuli cv. ICCV-2, were used for the study. five different explants viz., cotyledonary node with cotyledon (CNC), cotyledonary node with part of the cotyledon (CNP), cotyledonary node (CN), shoot tip (ST) and embryo axes (EA) were tried. The explants were dissected from 1-week-old seedlings aseptically germinated on half strength MS medium. shoot regeneration was achieved from explants cultured on MS medium supplemented with different cytokinins like thidiazuron (TDZ), 6-benzylaminopurine (BAP) and kinetin (KIN), Maximum number of shoots were produced when TDZ was used as the source of cytokinin across the genotypes and explants. Effectiveness of cytokinin was in the order of TDZ > BAP > KIN. The kabuli cv. ICCV-2 showed better response to BAP supplementation than both the desi cultivars (ICCV-10 and Annigeri). In General, CN (5.657) gave more number of shoots followed by CNP (4.733). Embryo axes gave only shootbuds and they failed to elongate. Irrespective of the genotypes, best results were obtained on MS medium supplemented with 0.1 mg l⁻¹ TDZ using CN as explant source. Shootbuds obtained using TDZ elongated on MS medium supplemented with either 3 mg l⁻¹ or 4 mg l⁻¹ BAP. Highest percentage of rooting of ICCV-10 (61.20%) was found on MS medium supplemented with 0.7 mg l⁻¹ IBA while ICCV-2 (43.45%) and Annigeri (67.45%) showed high percentage of rooting on MS medium supplemented with 0.7 mg l⁻¹ NAA. Few but longer roots were observed using either IBA or NAA, while fibrous roots were seen when IAA was used.

GENETIC VARIATION FOR PRODUCTIVITY AND BRUCHID RESISTANCE IN GREENGRAM [VIGNA RADIATA (L.) WILCZEK]

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ABSTRACT

An experiment was conducted to elucidate information on the nature and magnitude of genetic variability, for important productivity characters and for bruchid resistance. Field experiment was conducted using 121 diverse genotypes laid out in RBD with three replications. Very high variability, heritability and genetic advance were observed for plant height, pods per plant, seeds per pod, 100 seed weight and seed yield per plant. Seed yield was associated strongly and positively with pods per plant and pods per cluster. Pods per plant, pods per cluster and pod length exerted high direct effect on seed yield.

The germplasm lines viz., LM-67-402, 86, M-89 and PHL-18 were highly resistant to bruchids. The reduction in weight was associated strongly and positively with per cent seed damage, number of adults and number of eggs. Per cent seed damage exerted high direct effect on reduction in seed weight.

Bold and medium size and round shape seeds were positively associated with level of resistance, while it was negative association with smooth seed texture. There was no association of seed coat color and pubescence on pod with level of resistance.

Based on D^2 values, the genotypes were grouped into ten divergent clusters. Cluster I comprised of highly resistant genotypes, but the poor productivity traits. Cluster III contained genotypes which were highly susceptible and with better productivity traits. Hybridization between genotypes of these two clusters is expected to combine resistance with productivity traits.

A wide variation was observed for both trypsin and alpha-amylase inhibitors. Analysis of consideration on amylase or trypsin inhibitor alone can't explain resistance to *Callosobruchus chinensis* (L.). Resistant genotypes have high levels of both inhibitors, while genotypes with low levels of inhibitors were bruchid susceptible. Therefore, breeding for high contents of amylase, trypsin inhibitor and other antinutritional compounds can be an effective way to obtain cultivars resistant to storage pest.

VARIABILITY AND ASSOCIATION ANALYSIS FOR PRODUCTIVITY TRAITS IN SEGERAGATING POPULATIONS OF GREENGRAM (*Vigna radiate* (L) Wilczek)

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ABSTRACT

An investigation was carried out during kharif 2001 to assess the variability generated by hybridization and to study the association pattern among the component traits of seed yield. Six crosses involving five genotypes viz., Chinamung Selection-4 TM98-50 ML-3 and Pusa Baisaki were selected based on their F_1 performance. These F_1 s were advanced to F_2 . The segregating populations (Six F_2 s) thus evaluated for eight quantitative traits on 200 randomly selected plants in each cross. There was increase in mean and variance in F_2 populations except for pod length and plant height as compared to the parents. A wide range was observed for pod yield number of pod per plant and number of clusters per plant.

The GCV heritability and GAM values were higher in the F_2 s for seed yield per plant number of pods per plant and 100-seed weight. High heritability coupled with high genetic advance were observed for number of clusters per plant, number of seeds per pod and 100-seed weight in all the segregating populations.

Highly significant positive correlation of seed yield was observed with number of pods per plant number of primary branches per plant, number of clusters per plant pod length and 100-seed weight in all the segregating populations. Plant height exhibited non-significant association indicated the possibility of combining higher seed yield with dwarf types. Path co-efficient analysis of seed yield cross the different populations and further the same trait had maximum indirect contribution through number of pod clusters per plant confirming this traits as important yield attributes.

More number of transgressive segregates were recorded for number of seeds per pod followed by seed yield and number of pods per plant.

ASSESSMENT OF GENETIC VARIABILITY IN SEGREGATING POPULATIONS OF DIFFERENT CROSSES IN GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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ABSTRACT

An investigation was carried out to know the extent of genetic variability released on account of limited intercrossing among the random segregants (BIPs) as compared to their corresponding selfed populations (F_2) in three diverse single crosses of groundnut during *kharif 2001* at the Main Research Station, University of Agricultural Sciences, Dharwad.

As seen from the mean and ranges, plant height, pod number, pod yield kernel yield and shelling per cent showed higher mean and upper limit of ranges in BIP's compared to their corresponding F_2 and parents indicating the release of concealed variability, thus offering greater scope for selection to operate. Whereas traits like number of branches and oil content showed little or no response to intermating indicating the persistence of tight linkages. There was reduced incidence of *spodoptera* damage, early leaf spot and late leaf spot as seen from their lower means in BIP's which might be due to mop up of alleles for resistance. The coefficients of variations were in line with mean and ranges. The traits like plant height, pod yield and kernel yield have shown high heritability and genetic advance indicating higher gain from selection for these traits in BIP's compared to their F_2 .

The shifts in correlations from negative to positive between oil content and pod yield, oil content and kernel yield, sound mature kernels and 100-kernel weight are the indications of break up of inverse relations. As seen from path analysis the direct negative effect of pod number and indirect negative effect of pod number through plant height have changed to positive effects. The frequency of desirable segregants for pod yield was higher in BIP's compared to their corresponding F_2 . The cross TAG-24 x Dh-22 was more responsive to intermating compared to other two crosses (TMV-2 X ICGV 86699 and TAG 24 X JL 24) indicating the genotypic differences.

ASSOCIATION AND STABILITY ANALYSIS FOR PRODUCTIVITY TRAITS IN BLACKGRAM [VIGNA MUNGO (L.) HEPPER]

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ABSTRACT

Twenty nine blackgram advance breeding lines along with two check varieties were evaluated in a randomized block design with three replications in three diverse locations viz., Dharwad, Bidar, Bailhongal, during *Kharif* 2001. The main objectives of the experiment were to evaluate the selected advance breeding lines of blackgram for character association, stability and diversity analysis, besides estimating protein and sugar content of the genotypes.

Analysis of variance revealed significant differences among the genotypes for all the eight quantitative traits at all the three environments, suggesting a high degree of variability among the test genotypes. The association analysis revealed that seed yield per plant exhibited significant positive association with clusters per plant, pods per plant and pod length at all the three environments and path analysis indicated that pods per plant exhibited high direct effect on seed yield per plant followed by pod length at all the three environments.

The pooled analysis of variance revealed significant differences among the genotypes and environments for all the characters, indicating genotypes and environments for all the characters, indicating genotypes and environments tested are diverse in nature, where as genotype x environment interaction was also significant for all the eight characters suggesting that genotypes interacted significantly with the environments. On the basis of stability parameters DBS-16 was a promising genotype for the majority of characters with higher mean performance across the environments. The genotypes like DBS-14, DBS-15, DBS-22, DBS-24 and DBS-29 were also best yielders across the environments, compared to check varieties TAU-1 and Manikya. DBS-26 and DBS-18 at Dharwad, while, DBS-14 and DBS-22 at Bidar and DBS-14 and DBS-24 at Bailhongal are the best Performing genotypes.

Pooled genetic diversity analysis revealed that, plant height contributed maximum towards genetic divergence followed by pods per plant and days to maturity traits. Based on D^2 values, the thirty-one genotypes were classified in to four clusters. Based on inter cluster distance and contribution of different traits to diversity, the genotypes like DBS-16, DBS-29 and Manikya are desirable parents for recombination breeding programme for the improvement of black gram. Two genotypes DBS-7 and DBS-21 can be considered as low flatulence producing genotypes on the basis of lower sugar content in seeds across the three test environments.

COMBINING ABILITY STUDIES AND MOLECULAR CHARACTERISATION OF PARENTS OF F₁ S IN SUNFLOWER (*Helianthus annuus* L.)

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ABSTRACT

In the present study three CMS lines and five restorers were tested for combining ability and their 15 hybrids were evaluated for the extent of heterosis for eight characters viz., days to fifty percent flowering, plant height, head diameter, days to maturity, hundred seed weight, plant yield, oil content and kernal protein content using line x tester method. The genotypes were planted in randomized block design replicated thrice along with checks KBSH-1 and MSFH-17 during rabi-summer 2001-02. In addition, the polymorphism amongst the parents and their F₁s was studied using isoenzymes and seed proteins.

The study revealed predominance of non-additive gene action for majority of the characters. Among the lines CMS-4546 and CMS-103A recorded high gca effect for head diameter hundred seed weight plant yield and oil content. The testers R-64NB and R-12Nb were good general combiners for yield and its attributes while R-3NB exhibited high gca effect for earliness and protein content. A positive and significant sca effect for plant yield was observed in six hybrids. The hybrids CMS-103A x R-64 NB and CMS-4546A x R064NB exhibited high plant yield and oil content respectively over checks.

The hybrids recorded high mid parent and average heterosis for plant yield plant height hundred seed weight and protein content. The average heterosis for seed yield per plant was 46.52 percent. The hybrid CMS-103A x R-64NB recorded high standard heterosis for plant yield (104.17%) and oil content (8.63%). The hybrids exhibited negative average heterosis for days of fifty percent flowering and days to maturity indicated earliness.

The electrophoretic studies on isozymes and seed protein revealed remarkable variation in the banding pattern with respect to presence or absence of the bands among parents and hybrids. The isozyme peroxidase was the best discriminator followed by malate dehydrogenase. However, characterization based on seed proteins was found difficult due to the similarity among most of the genotypic profiles.

STUDIES ON GENETIC MALE STERILITY SYSTEM IN CULTIVATED DIPLOID COTTON AND ITS UTILIZATION FOR EXPLOITATION OF HYBRID VIGOR

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ABSTRACT

The present study was conducted at Agricultural Research Station Dharwad Farm during kharif 2001-02 to estimate the heterosis in intra and interspecific diploid cotton hybrids and genetic variability for earliness, yield and yield components, fibre quality traits and oil content, the genetics of male sterility, the effect of temperature on GMS system and to analyse the cause for the male sterility.

Heterosis study revealed that the crosses viz., DS-5 x DDhC -11, DGMS-12 x H-130, GAK-8615 x GShV-395 among interspecific crosses and DS-5 x 30802, DS-5 x DLSa-9, DS-5 x DLSa-8 and DS-5 x DLSa-17 among intraspecific crosses were found highly heterotic and these crosses may be used for exploitation of hybrid vigour. High genotypic variability, heritability and genetic advance as percent of mean was observed for number of bolls, seed cotton yield, lint yield, sympodial length, boll weight and number of monopodia which indicated that such variability can be exploited for improvement in these characters. The high positive correlation of seed cotton yield with boll weight, number of bolls, seeds per boll, lint index, seed index and GOT showed that selection for these characters will increase cotton yield. Path analysis revealed that in selection programme emphasis should be placed on boll weight, sympodial length, number of sympodia and lint yield, since these characters have high positive direct effects on seed cotton yield. Genetics of GMS system in diploid cotton indicated that, the male sterility system was governed by a single recessive gene. The TGMS lines DS-5 and GAK-423, under reduced minimum temperature of below 18°C get converted into fertile lines and histological study in these lines revealed that the callose wall around the tetrads was mainly responsible for male sterility and which gets dissolved when temperature is reduced to below 18°C and hence produce fertile pollen.

SCREENING GROUNDNUT GENOTYPES FOR RESISTANCE TO IN VITRO INFECTION BY *ASPERGILLUS FLAVUS* LINK.

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ABSTRACT

In recent times aflatoxin contamination has become a major impediment in groundnut international trade in view of carcinogenic nature of this mycotoxin. Integrated management involving resistant varieties is the best solution to control this problem. In view of very limited information on the reaction of groundnut varieties cultivated in Karnataka, an investigation was carried out to identify genotypes resistant to seed colonisation by *Aspergillus flavus*.

Though all the fifteen cultivars of Karnataka showed susceptible reaction, five varieties viz., S 230, R 8808, ICGV 8659Q, Spanish Improved and Mutant 28-2 were significantly less susceptible as compared to check, TMV 2. Among the forty-eight germplasm screened, an inter-specific derivative ICGV 86699, a dormant line ICGV 86155 and an advanced breeding line ICGV 96266 showed resistance reaction. ICGV 86699 and ICGV 96266 were also resistant to late leaf spot and rust.

Screening fifty-four Trombay groundnuts resulted in identification of resistance in five large seeded genotypes viz., TG 18, TG 18A, TG 19, TG 22 and TG 49. Among them TG 18, TG 19 and TG 22 were also resistant to *Sclerotium rot*. TG 19 recorded the highest resistance to seed colonisation by *A. flavus*.

Among the ninety-two mutants derived from two susceptible parents (DER and VL 1), four mutants (104-9 VB-1, 104-9 VB-2, SB 6 and VB 7) showed fairly good level of resistance clearly demonstrating the potential of induced mutagenesis in developing genotypes resistant to *A. flavus*.

Screening 106 confectionery lines derived from eight crosses revealed the potential of three crosses viz., TG 49 x R 9227, R 9227 x TG 49 and TG 49 x B 37c for resistance to *A. flavus*. Confectionery lines TO 49 x R 9227-13, R 9227 x TO 49-12 and 27-1 and TO 49 x B 37c -88 with high test weight and good yield potential, showed significant level of resistance to *A. flavus*.

Most of the genotypes identified in this study have high level of resistance compared to resistant check, J 11.

EVALUATION OF CHILLI (*Capsicum annuum* L.) GERMPLASM FOR PRODUCTIVITY ITS COMPONENT TRAITS AND RESISTANCE TO SOME BIOTIC STRESSES

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ABSTRACT

AN investigation on chilli was undertaken with two experiments during kharif 2001 and summer 2002. The chilli germplasm was evaluated for productivity its components traits genetic diversity and residence thrips mites and viruses at flowering and maturity during *kharif* 2001. Twelve genotypes were selected on based on resistance and susceptibility for further evaluation and to asses the genotypes x year interaction. The analysis of variance indicated highly significant differences among the genotypes for all the characters under study. Yield related fruit related traits except stalk length and pest and disease parameters exhibited high GCV, PCV, and high heritability coupled with high genetic advance.

Dry fruit yield per plant showed significant positive association with all fruit related yield related and growth related traits except for number of branches/plant while it showed negative correlation with all biotic stresses. Fruit volume, followed by pericarp weight, average fruit weight and number of branches/plant showed high direct positive effect, while fruit length, diameter, surface area, and seeds per pod exerted direct negative effect on yield. The 46 germplasm were grouped into 13 clusters. Cluster XIII having VN-2 genotype showed maximum average mean value of pest and disease scores.

None of the genotypes were highly resistance of immune to all the three biotic stresses. The genotype VN-2 emerged as highly resistant to mites and thrips and moderately resistance to viruses. The isozyme patterns of 12 selected genotypes with respect to Peroxidase Catalase and super oxide Dismutase showed only quantitative differences for resistance to biotic stresses.

Plant height, fruit/plant fruit weight and fruit related traits except stalk length and seed/pod and yield related traits except dry fruit yield/plant showed lower magnitude of V_e and $V_g \times y$ components along with high heritability and high genetic advance. However mites and viruses scored at flowering and mites scored at maturity recorded either high V_e or $V_g \times y$ or both.

GENETIC TRANSFORMATION FOR POD BORER RESISTANCE USING *cry 1 A (b)* IN PIGEONPEA [*Cajanus cajan* (L.) Millsp] cv ICPL-8863 (MARUTI)

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ABSTRACT

A study was undertaken to standardize in vitro plant regeneration and *Agro bacterium* mediated transformation procedure for pigeonpea (*Cajanus cajan*) cv. ICPL-8863 (Maruti). For regeneration direct organogenesis was attempted using different viz., shoot tip (ST), cotyledonary node (CN), half cotyledon with cotyledonary node ($\frac{1}{2}$ CNC) and CNC. These were cultured on various levels of benzyl amino purine (BAP) (1, 2, 3, 4 mg l^{-1}) and thidiazuron (TDZ) (0, 0.01, 0.05, 0.1, 0.5 mg l^{-1}). CNC found to produce average of 1.69 shoots/ explant and was better among all explants used. Among different levels of BAP and TDZ tried, BAP 2 mg l^{-1} was found to be better for multiple shoot and shoot bud induction. Shoot buds were cultured on MS with reduced levels of cytokinin and TDZ 0.05 mg l^{-1} gave better elongation compared to other levels. Elongated shoots were rooted on MS with IBA (0.1-0.5 mg l^{-1}). Among all the levels tried 0.2 mg l^{-1} IBA gave healthy roots.

For transformation *Agro bacterium* strains EHA 105 harboring p-BinBt1 plasmid [*cry 1 A(b)*] and harboring pCAMBIA1301 plasmid (*gus*) with *nptII* as selectable marker, which confers kanamycin resistance were used. Initially kanamycin sensitivity of control explants was tested at different growth stages. Inhibitory levels at different stages were used for selection of transformants. Precultivation of explants on MS with 2 mg l^{-1} BAP for two days prior to co cultivation resulted in increased survival. Explants were co cultured for two days in dark and transferred to selection medium (with kanamycin and cefotaxime). Approximately 1.4 per cent shoots obtained were *cry* positive.

In *in planta* approach plants were treated with *Agro bacterium* inoculum at different growth stages. Germinating seeds were injected with GV2260 strain and shoots were histo-chemically assayed and 0.9% of shoots were *gus* positive. In seedling dip and flower injection methods *cry1A (b)* gene was transferred and confirmed through PCR analysis (9/54, 11/26 plants were *cry* positive respectively). Thus efficient regeneration and transformation protocol has been standardized for pigeonpea cv. ICPL-8863 (Maruti).

INFLUENCE OF SEED TREATMENTS AND PACKAGING MATERIAL ON STORABILITY OF GAILLARDIA CV. DGS-1

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ABSTRACT

Laboratory experiment was conducted on storability of Gaillardia seed Cv. DGS-1 in the department of seed science and technology, University of Agricultural Sciences, Dharwad during 2001-02. There months old seeds were stored for a period of 11 months under ambient conditions to investigate the influence of packaging material, desiccant and seed treatments on seed quality. The packaging material included single layer polythenebag (400 gauge) with and without silicagel, two layer polythenebag (400 gauge) with and without silicagel and clothbag. Seeds were treated with captan, chlorax and their combination.

Irrespective of treatments the moisture content of seed stored in polythene bag with silicagel decreased gradually and maintained constant after certain period, while it remain unchanged during storage in seeds stored in polythenebag without silicagel. However seed moisture content fluctuated inconcomitant with the prevailing atmospheric relative humidity in seed stored in cloth bag.

The seed quality decreased with increase in the storage period. However significantly highest germination (69.33%), root length (3.1 cm), shoot length (3.48 cm), vigour index (456), dry weight (20.45 mg), germination rate index (13.95) and filed emergence (60.67%) and lowest electrical conductivity of seed leachate (0.690 dSm⁻¹) were recorded in chlorax (3 g/kg) treated seed and stored in two layer polythane packet (400 gauge) with silicagel at the end of storage period compared to other combinations.

INFLUENCE OF SEED PELLETING ON STORABILITY, CROP GROWTH SEED YIELD AND QUALITY IN SUNFLOWER (*HELIANTHUS ANNUUS* L.)

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ABSTRACT

The experiment was conducted on sunflower Cv. Morden to ascertain the influence of seed pelleting with chemicals and filler materials on storability, crop growth, seed yield and quality.

The experiment consisted of twelve treatments involving, four seed treatment chemicals viz., ammonium molybdate (5000ppm), zinc sulphate (2%), diammonium phosphate (5%) and boron (0.5%), and two pelleting materials viz., wood ash and neem kernel powder along with control (no filler material).

The storage study revealed that, the seeds treated with zinc sulphate performed better throughout storage period and at the end of twelve months of storage, it recorded significantly higher germination (74.41%), root length (15.23cm), shoot length (12.56cm), seedling dry weight (38.36mg) vigor index (2105) and lower electrical conductivity (2.53 dSm^{-1}), and fungal infection (12.70%) compared to seeds treated with ammonium molybdate, boron and diammonium phosphate. The unpelleted seeds performed better than pelleted seeds by recording significantly higher germination (68.42%), root length (14.02cm), shoot length (12.03cm), seedling dry weight (37.29mg), vigor index (1829) and lower electrical conductivity (2.64 dSm^{-1}) and fungal infection (13.69%).

During field studies, the zinc sulphate treated seeds showed significantly higher plant height at 50percent flowering (69.04cm) and at harvest (81.11cm), capitulum diameter (14.27cm), capitulum dry weight (74.92g), number of filled seeds per capitulum (788.21), seed set (92.91%), 100 seed weight (5.13g), seed yield (2002 kg/ha) besides early in 50 percent flowering (41.77 days). Seed quality parameters such as germination (95.66%), root length (20.91 cm) and shoot length (17.11 cm), seedling dry weight (56.27mg), vigor index (3637) were significantly higher and lower electrical conductivity (1.46 dSm^{-1}) in zinc sulphate treated seeds.

Among filler materials the seeds pelleted either with wood ash or neem kernel powder were not superior over unpelleted seeds on growth, seed yield and quality attributes.

INFLUENCE OF GROWTH RETARDANTS ON SEED YIELD AND QUALITY AND SEED TREATMENTS ON STORABILITY OF COWPEA CV. C-152

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ABSTRACT

THE field investigation was carried out at Main research Station, University of Agricultural Sciences Dharwad during *kharif* season of 2001 to find out influence of growth retardants on seed yield and quality and also the influence of seed treatments on storability of cowpea Cv. C-152 during 2001-02 in the laboratory of department of Seed Science and Technology Agricultural College, Dharwad.

The results of study indicated that, among the various growth retardants spraying of TIBA 50ppm at flowering decreased the plant height with significant increase in the yield contributing characters like number of pods per plant (15.47), pod weight per plant (22.37 g), number of seed per pod (13.80), seed weight per plant (21.05 g) and seed yield (1200 kg ha^{-1}) as compared to control followed by TIBA 25ppm MH 200ppm and MH100ppm. Growth retardant spray had no significant effect on seed quality parameters viz., germination percentage, moisture content, protein content, and electrical conductivity. Whereas, root length, (21.54 cm) shoot length (16.88 cm) vigour index (3544) field emergence (86.50%) were significantly highest in TIBA 50ppm compared to control followed by TIBA 25ppm MH200ppm, MH100ppm.

Seed treatment with insecticides, fungicides, halogens, and plant products showed significant influence on storage potential of cowpea seeds. The viability of cowpea seeds decreased with increase in storage period in all treatments. Among the seed treatments seeds treated with potassium iodide, chlorax, castor oil and neem oil recorded higher germination percentage, vigour index and field emergence whereas moisture content, electrical conductivity and insect infestation were lower as compared to control.

INFLUENCE OF ORGANICS ON SEED YIELD, QUALITY AND STORABILITY STUDIES IN GREENGRAM CV. CHINAMUNG

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ABSTRACT

The investigation was carried out to find out the influence of organics on growth, seed yield, quality and storability in greengram Cv. Chinamung. The field experiment was conducted at Agricultural Research Station Bagalkot, during *kharif* 2001. Which involves fifteen treatments with different organics in randomized block design with three replications.

Application of RDF+FYM 2.5 t ha⁻¹ recorded significantly higher number of pods (22.1), number of seeds (220.3), pod weight (20.6 g), seed yield (11.1 g), per plant and also 100seed weight (5.14 g), seed yield per ha (1096 kg), germination (94.5%), vigour index (2889) and protein content (23.15%) compared to other treatments.

The storage studies made in the seed science and Technology Laboratory of Agricultural College, Dharwad from October 2001 to August 2002. Which involved five seed treatment and two containers revealed that seeds treated with castor oil recorded higher germination (73.50%), germination rate index (25.01), root length (11.19 cm), shoot length (8.40 cm), vigour index (1450) and lower moisture content (9.28%) electrical conductivity of seed leachate (1.38 dSm⁻¹), infestation (18.75%) followed by captan at the end of 10 months of storage period.

Among the containers seed stored in polythene bag recorded significantly higher germination (71.15%), root length (11.14 cm), shoot length (8.11 cm) and lower moisture content (9.21%), electrical conductivity (1.39 dSm⁻¹) and infestation (34.10%) at the end of the ten months of storage period and further the seeds treated with castor oil and stored in polythene bag showed significantly higher germination (74.72%) and vigour index (1517) and lower infestation (18.75%) at the end of the ten months of storage.

EFFECT OF GROWTH REGULATORS AND NUMBER OF TRUSSES ON SEED YIELD AND QUALITY IN TOMATO (*LYCOPERSICON ESCULENTUM* MILL.)

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ABSTRACT

A field experiment was conducted at Main Research Station, University of Agricultural Sciences, Dharwad during kharif 2000, to study the effect of growth regulators and number of trusses on seed yield and quality of tomato Cv. L-15. The experiment was laid out in split plot design with three replications involving 16 treatment combinations with growth regulators (GA₃ 25ppm NAA 100ppm and IAA 100ppm) and retention of trusses (2,4 and 6 trusses) and water spray and all trusses intact were control treatments.

Among the growth regulators GA₃ 25ppm recorded significantly higher fruit yield per plant (1.66 kg) seed yield per plant (9.25 g) and ha⁻¹ (153.1 kg) compared to other treatment and it was followed by NAA 100ppm and IAA 100ppm. Seed quality parameters viz., germination (93.68%) shoot length (8.67 cm), root length (5.89 cm) and vigour index (1374) were higher GA₃ 25ppm followed by NAA 100ppm [germination (9.68%) shoot length (8.11 cm) root length (5.82 cm) and vigour index (1264)] and least was IAA 100ppm.

Retention of all trusses recorded significantly higher fruit yield ha⁻¹ (29.79 t) and seed yield ha⁻¹ (171.3 kg) compared to other treatments. Seed quality parameters viz., germination (92.37%) shoot length (8.25 cm) root length (5.93 cm) and vigour index (1307) were significantly higher in the treatment with two trusses per plant compared to other treatments.

Among the treatment combinations GA₃ 25ppm with retention of all trusses recorded significantly higher fruit yield ha⁻¹ (36.64 t) seed yield per plant (12.16 g) and ha⁻¹ (213.6 kg) and was followed by NAA 100ppm with all trusses. The C:B ratio was higher with combination of GA₃ 25ppm and retention of all trusses (4.38) and followed by NAA 100ppm with retention of all trusses (3.94).

EFFECT OF NPK, ZnSO_4 AND MgSO_4 ON GROWTH, SEED YIELD AND QUALITY OF GARDENPEA [*PISUM SATIVUM* (L.)] CV. BONNEVILLE

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ABSTRACT

Two field experiments were conducted during rabi seasons of 2001-02 at Main Research Station University of Agricultural Sciences Dharwad to study the "Effect of NPK, ZnSO_4 and MgSO_4 on growth, seed yield and quality and quality of gardenpea (*Pisum sativum* (L) Cv. Bonneville. Application of different levels of NPK fertilizers recorded significant difference for crop growth seed yield and its attributes besides quality parameters. In general the significant increasing trend was inconsistent under different fertilizer levels for all the parameters studied. The application of 37.5:78:50 NPK kg per ha⁻¹ recorded significantly highest seed yield (1984 kg ha⁻¹) followed by 37.5:72:50 NPK kg ha⁻¹ (1902 kg ha⁻¹) and 37.5:78:65 NPK kg ha⁻¹ (1866 kg ha⁻¹). Compared to control (1571 kg ha⁻¹). MgSO_4 recorded significantly higher crop growth seed yield and its attributes and quality parameters as compared to ZnSO_4 irrespective of the methods of application. Among the methods of application the M₇ (SA+ST+FS) method recorded significantly highest crop growth seed yield and quality parameters compared to rest of the methods of application irrespective of nutrients used. The significantly higher seed yield with better quality traits was noticed in M₇ (1878 kg ha⁻¹) followed by M₅ (SA+FS) (1798 kg ha⁻¹) and M₄ (SA+ST) (1778 kg ha⁻¹) over the control. The interaction effect between nutrients and method of application (N×M) was found to be non-significant for all the parameters studied. In general, higher seed yield and quality was obtained in the both the nutrients when applied as soil application seed treatment and foliar spray over rest of the treatment combinations.

EFFECT OF PROVENANCE, SEED TREATMENT AND CONTAINERS ON STORABILITY OF CHILLI (*CAPSICUM ANNUUM* L.) SEEDS

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ABSTRACT

The chilli (*Capsicum annuum* L.) cv. Byadagi kaddi seeds having seven percent moisture content were treated with Bavistin (2 g/kg), thiram (2 g/kg), CaOCl_2 (10 g/kg), Ascorbic acid (1%), ZnSO_4 (1%), MgSO_4 (1%), DAP (10g / kg), Arappu leaf powder (10 g/kg), Neem leaf powder (10 g/kg) along with untreated control were store under ambient conditions of Dharwad, Bijapur and Raichur. The seeds were packed in paper bag and 700 gauge polythene bag. At the end of storage period of 12 months, the seeds stored at Bijapur recorded higher seed quality parameters such as germination (%), root length (cm), shoot length (cm), vigour index, seedling dry weight (mg/seedling) and lower electrical conductivity (dSm^{-1}) and moisture content (%) followed by Raichur and Dharwad storage locations. Irrespective of storage places and containers, the seeds treated with thiram recorded higher seed quality parameters followed by bavistin and CaOCl_2 , respectively. Among the containers, seeds stored in 700 gauge polythene bag recorded higher seed quality parameters. In general, seed quality decreased with the advancement of storage period in all the three locations irrespective of seed treatment with chemicals and botanicals and storage containers. The seeds treated with thiram and stored in polythene bag recorded highest germination percentage of 76.00, 73.51 and 66.33, while untreated control seeds stored in paper ban recorded 68.19, 64.01 and 48.14 percentage at the end of 12 moths of storage at Bijapur, Raichur and Dharwad, respectively. The vigour index of thiram treated seeds stored in polythene bag was 1171, 969 and 753, while untreated control seeds stored in paper bag recorded 754, 586 and 339 for the same storage period at Bijapur, Raichur and Dharwad, respectively.

USE OF GOLD ORE TAILINGS AS A SOURCE OF MICRONUTRIENTS IN AGRICULTURE

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ABSTRACT

Gold Ore Tailings (GOT) is the waste developed after the extraction of Gold using cyanide process. Before disposal, GOT slurry was recycled in mill to bring down the cyanide to minimum possible limit (< 15 ppm). The GOT is rich in micronutrients viz., total Fe (12.6%), Mn (2.19%), Cu (0.0217%) and Zn (0.008%). The aged GOT (2-3 years old) was used to conduct laboratory and field experiments during *kharif* 2001 to know the effect of GOT and copper ore tailings (COT) on the release of available Zn, Cu, Fe and Mn, soil enzyme activity, growth, yield and nutrient uptake of Cauliflower. In laboratory study, GOT and COT with FYM significantly increased the release of available Zn, Cu, Mn, and Fe and enzyme activity. Maximum release of Zn (1.84 ppm) and Cu (3.26 ppm) was in COT 1.5 t/ha with FYM and the available Fe (13.68 ppm) and Mn (11.96 ppm) was in GOT 2.00 t/ha with FYM. The enzyme activity was not significantly affected by applications of GOT and COT compared to control.

In the field experiment, different levels of GOT were tried individually and in combination with different levels of GOT. The highest curd diameter (28.62 cm) and curd yield (25.75 t/ha) was noticed in GOT 1.0 t/ha + COT 0.5 t/ha. Application of GOT and COT together significantly enhanced the N,P,K,Zn,Cu, Fe and Mn uptake by Cauliflower at all stages of crop growth, however, CN, Pb and As uptake was below the permissible limit. The residual micronutrients status of soil was greatly enhanced by application of GOT and COT together. Application of GOT 1.0 t/ha + COT 0.5 t/ha has recorded higher net returns (Rs. 10.3000 / ha) with B:C ratio of 2.59 when compared with the application of recommended fertilizer alone.

SOIL FERTILITY STATUS OF A PART OF GLBC COMMAND AREA USING GIS

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ABSTRACT

The idea of optimizing the utilization of the land resource with intensification of agriculture has resulted either in the fast depletion of nutrients or occasionally in their accumulation especially noticed in command area. An attempt was made to assess the soil fertility status of a portion of GLBC command area (46029.9 ha) in relation to position of landscape was assessed.

Two hundred and forty two surface soil samples were collected at random from the study area lying between GLBC main canal and Ghataprabha river representing all physiographic positions of landscape.

The pH of the soils was slightly to moderately alkaline (8.02 to 8.96) and EC at the surface ranged from 0.11 to 1.40 dS m⁻¹ and was slightly on the higher side in alluvial plains. Majority of the soils recorded medium to high OC content ranging from 0.34 to 1.33 per cent. The CaCO₃ content ranged from 5.13 to 11.55 per cent.

The available nitrogen content ranged from 211.0 to 321.6 kg ha⁻¹ with in 19540 ha as low and 26490 ha as medium status. The available phosphorus content ranged from 12 to 38 kg ha⁻¹ with 11354 ha area recording medium and 34677 ha area as high in P status. The available potassium status was high in 40612 ha and medium in 5418 ha area ranging from 201 to 689 kg ha⁻¹.

The exchangeable Ca and Mg content of all the soils were high. The available sulphur content ranged from 17.5 to 53.5 kg ha⁻¹ with 12420 ha area recording low, 31563 ha medium and 2047 ha high in sulphur content.

Due to intensive irrigated agriculture practiced in command area, nutrient status did not follow distinct trend with respect to physiographic units and crops grown.

STUDIES ON IRON NUTRITION IN GROUNDNUT [*ARACHIS HYPOGAEA L.*] AS AFFECTED BY DIFFERENT DEGREES OF CALCAREOUSNESS IN VERTIOSOLS

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ABSTRACT

Characterization of calcareous Vertisols was made with special reference to free CaCO_3 and HCO_3 . A pot culture experiment was conducted in winter season of 2001-2002 in Agriculture College Farm, Dharwad. Groundnut (JL-24) was used as a test crop to know the soil factors (CaCO_3 and moisture) influencing iron availability and translocation of iron in plants. The soil selected from four places namely, Chilakwad and Yamanur (Navalgund taluk), Kalasapur and Nagavi (Gadag taluk) represent four levels of CaCO_3 (8.75, 12.75, 18.00 and 23.00% CaCO_3). Soil selected from all the places was alkaline in pH, non-saline and medium in organic carbon.

Particle size distribution of free calcium carbonate revealed that as particle size increases per cent CaCO_3 also increases. In sand fraction per cent CaCO_3 was from 48.58 to 59.09% and 7.50 to 11.41% in clay fraction. DTPA-Fe was found to be more in clay fraction (8.67 to 13.11 ppm) than in silt and size fractions.

Plants grown in pots were analysed for ferrous (Fe^{2+}), total soluble iron and total iron in stem, younger leaves and older leaves. Ferrous iron concentration found to be decreased with increase in CaCO_3 level. Even with the increase in ferrous iron concentration from 60 to 70 DAS, the plants are considered as chlorotic. Ferric (Fe^{3+}), total soluble iron and total iron considered increased with increase in CaCO_3 levels.

Haulm yield was not affected significantly by CaCO_3 levels, but pod yield decreased significantly with increase in CaCO_3 levels from 10.29 to 8.27 mg/pot.

Bicarbonate ion concentration and water soluble iron increased at 70 DAS over initial values due to increase in moisture content from 60 to 70 DAS.

Amorphous iron oxide and DTPA iron decreased with increase in CaCO_3 levels over initial values at the harvest of the crop.

EFFECT OF ORGANICS AMENDED ROCK PHOSPHATE AND PHOSPHATE SOLUBILIZER ON FRENCHBEAN [*Phaseolus vulgaris* (L.)]

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ABSTRACT

A field experiment was conducted at the Water Management Research Centre (WMRC), Belvatagi, Navakgund Tq, Dharwad Dist. During rabi season of 2000, on a vertisol to study the effect of organics amended rock phosphate with P-solubilizer. The experiment was laid out in randomized block design with 12 treatments and three replications. The test crop was Frenchbean (*Phaseolus vulgaris* L.)

The results of the experiment revealed that application of P as rock phosphate amended with farm yard manure and vermicompost (1:1 or 1:2) and inoculation with P-solubilizer proved to be significantly superior to sole application of rock phosphate with respect to yield, P uptake by crop and available P in soil at all stages of crop growth. Application of organics amended rock phosphate gave on par results compared to the application of P as SS_P.

Highest apparent P recovery and P use efficiency of added P was obtained in the treatment where rock phosphate was amended with vermicompost (1:2) and inoculated with P-solubilizer (5.88% and 16.89 kg/kg, respectively) and was on par with treatment receiving P as single superphosphate.

The highest TSS and crude protein was obtained with the application of rock phosphate amended with vermicompost and FYM in ratio of 1:1 or 1:2.

Among all the treatments, application of P as rock phosphate amended with vermicompost or farm yard manure (1:1 or 1:2) with phosphate solubilizing bacteria inoculation was found to be the most remunerative in respect net returns (B:C ratio 2.03)

PERFORMANCE OF DIFFERENT ROUNDNUT CULTIVARS [*Arachis hypogaea*(L.)] AS INFLUENCED SOIL AND FOLIAR APPLICATION OF IRON SULPHATE IN A CALCAREOUS SOIL

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ABSTRACT

A field experiment was conducted at Amminabhavi village of Dharwad district during kharif 2000 to study the performance of different groundnut cultivars as influenced by soil and foliar application of iron sulphate in a calcareous soil. The experiment was laid out in a split plot design with groundnut cultivars as main plots and iron management practices as sub plots.

Among the different varieties tested FeESG-10 and FeESG-8 recorded significantly higher growth parameters viz., plant height, number of leaves, branches per plant, leaf area, leaf area index and dry matter production, Fe^{2+} content and lower per cent chlorosis than other three varieties (Dh-53, TMV-2 and JL-24) at all the stages of crop growth.

The yield parameters studied such as number of pods per plant, pod weight per plant, sound matured kernel and yield of groundnut were also significantly higher in the varieties FeESG-10 (1802 kg ha^{-1}) and FeESG-8 than other three varieties. The lowest yield was recorded with the variety Dh-53 (1515 kg ha^{-1}).

The quality parameters studied such as crude protein, specification number, iodine number, acid and oil content were non-significant among the different varieties studied and iron management practices. However, the uptake of nutrients by these varieties was significant.

Application of FeSO_4 either through soil or foliar spray resulted in significantly higher growth, yield and uptake of nutrients by the different groundnut cultivars studied. Between the soil and foliar application, foliar application resulted in significantly highest growth and yield parameters and lower per cent chlorosis. Nutrient status after the harvest revealed non-significant difference with varieties as well iron management practices.

NITROGEN MANAGEMENT IN DRILL SOWN RAINFED RICE USING LEAF COLOR CHART

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ABSTRACT

A field experiment was carried out during *Kharif* 2001 at Agriculture Research Station, Mugad, Dharwad to study the effect of nitrogen management using leaf color chart (LCC) as a tool to decide the rate and time of N application in drill sown upland rice. The nitrogen was applied @ 10, 20 and 30 kg ha⁻¹ per application in the LCC based treatments at weekly and biweekly observations at critical value of LCC-3. The treatments were compared with the recommended practice and farmers practices. The results revealed that application of N @ 20 kg or 30 kg ha⁻¹ based on LCC was found to be more beneficial in enhancing the growth and yield parameters of the upland rice. Although, basal application of N @ 20 kg ha⁻¹ increased the growth parameters, the yield and yield parameters appear to be not influenced by the basal dose of N. application of N during reproductive phase (panicle initiation to ten percent flowering) under LCC guided N management increased the yield and yield components. N application @ 20 kg or 30 kg ha⁻¹ each time based on LCC accounted for higher dry matter production than the recommended practice and farmers practice.

The partial factor productivity was found to be more in LCC based N management and can result in saving of fertilizer N up to 20 kg ha⁻¹ without reduction in yield. Considering the grains yield, net returns and saving of fertilizer N, application of nitrogen @ 20 kg ha⁻¹ based on biweekly LCC observation appears to be better method of N management in upland rice.

STUDIES ON POTTASIAM RELEASE PATTERN AND QUANTITY-INTENSITY RELATIONSHIP IN FLY ASH AND SEWAGE ALUDGE AMENDED SOILS

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ABSTRACT

Laboratory studies were under taken to evaluate the release pattern of potassium Quantity-Intensity relationship of potassium and effect of soil properties on potassium release pattern in soils amended with fly ash and sewage sludge.

Application of fly ash and/ or sewage sludge to soil decreased the release of exchangeable potassium in black soil but increased in red soil. Whereas, the release of non exchangeable potassium increased in both the soils. Addition of 50ppm K to amended soils decreased the total exchangeable potassium extracted. Whereas the total non exchangeable potassium extracted decreased in black soil but increased in red soil. Prolonged equilibration of soils for 30 days decreased the total exchangeable as well as non exchangeable potassium extracted in different treatments. A major portion of total exchangeable and non exchangeable potassium extracted from both the soils was released in the first extraction itself. The simple correlation analysis showed that the release of both exchangeable and non exchangeable potassium had positive correlation with silt, clay pH EC organic CEC exchangeable and non exchangeable potassium content but negatively correlated with sand.

Amending the soil with fly ash and /or sewage sludge with or without 50ppm K increased the equilibrium activity ratio (ARE^k) values, decreased the liable pool ($-\Delta K^0$) values and Gibbs free energy ($-\Delta G$) values in both the soils. Whereas, potential buffering capacity (PBC^k) values decreased in black soil but increased in red soil. Prolonged equilibration of soils for 30 days decreased the Are^k values $-\Delta K^0$ values and PBC^k values in black soil but increased in red soil. Whereas the $-\Delta G$ values increased in black soil and decreased in red soil.

The present investigation indicated that application of fly ash and sewage sludge improved the potassium supplying power of soils. Further, these amendments increased the immediate availability of potassium liable pool and PBC^k to a greater extent in red soil than in black soil.

RESPONSE OF CABBAGE TO BIO-METHANATED DISTILLERY EFFLUENT AND ITS INFLUENCE ON SOIL PROPERTIES

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ABSTRACT

A field experiment was conducted at Shri Lakshmi Narayana distillery factory field at Garag, Dharwad district during *rabi* season of the year 2001-2002 on red sandy clay loan soil (Kan Haplustalf) to study the response of cabbage to distillery effluent and its influence on soil properties. The experiment was laid out in split-plot design with three replications comprising four levels of effluent (10,000 25,000 and 50,000 l/ha and no effluent) and three levels of fertilizer (100, 75 and 50% RDF). The results showed that application of 25,000liters of effluent per ha had resulted in the highest cabbage yield of 30.37 tonnes per ha, it was significantly higher than 10,000 liters of effluent per ha (26.81 t/ha) and not effluent (24.98 t/ha). However, there was drastic reduction in the yield when the levels of effluent increased to 50,000 liters per ha (22.73 t/ha). Quality parameters such as protein and ascorbic acid content were not markedly influenced by the levels of effluent. The availability of major (N, P and K) and micronutrients (Fe, Cu and Zn) increased significantly with increase in effluent level.

Application of 100 per cent RDF registered the highest cabbage yield (28.90 t/ha) and it was significantly higher than 75 per cent RDF (26.64 t/ha) and 50 per cent RDF (23.13 t/ha). The availability of major nutrients was markedly increased by fertilizer levels.

Combined application of 25,000 liters of effluent per ha and 75 per cent RDF gave the highest yield (31.50 t/ha), net returns (Rs 45,145 /ha) and benefit cost ratio (2.87).

The study suggests that application of 25,000 liters of effluent per ha can save about 25 per cent of fertilizers without reduction in the crop yield.

MANAGEMENT OF SHOOT BORER, *LEUCINODES ORDONALIS* GUENEE ON POTATO

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ABSTRACT

Investigation on seasonal incidence, construction of life table, role of *Trichogramma spp.* and bioefficacy of chemical insecticides and botanicals against potato shoot borer, *Leucinodes orbonalis* Guenee were undertaken at Main Research Station, Dharwad during kharif 2001-02.

The incidence of the pest was noticed at 4 weeks after transplanting and there after the per cent shoot damage increased reaching the peak in September and further it decreased towards the harvesting.

Life table study indicated that the highest mortality was noticed on the younger larvae followed by pupae and older larvae. The key mortality factors like parasitoids, diseases and unknown causes were mainly responsible for mortality of *L. orbonalis*.

Out of five species of *Trichogramma*, *Trichogramma chilonis* Ishii was found effective in parasitizing the eggs of *L. orbonalis* under laboratory condition. The performance of inundative release of *T. chilonis* @ 1.5, 2.0, 2.5 and 3.0 lakh/ha in five installments starting from 30 DAP with 10 days intervals against *L. orbonalis* revealed that *T. chilonis* released @ 3.0 and 2.5 lakh/ha gave significant reduction in shoot, infestation and recorded higher tuber yield of 53.5 q/ha and 50.17 q/ha, respectively.

The efficacy of insecticides and botanicals sprayed three times with an interval of 20 days commencing from 30 days after transplanting against shoot borer revealed that thiodicarb 75 WP @ 0.15 per cent, deltamethrin 10 EC @ 0.01 per cent and lambda cyhalothrin 5 EC @ 0.05 per cent reduced the shoot infestation and recorded highest tuber yield of 52.2 q/ha, 42.40 q/ha 41.23 q/ha respectively compared to control (18.50 q/ha). Among botanicals neemgold (0.5%) and NSKE 5 per cent were found effective.

TESTING OF IPM MODULES FOR THE MANAGEMENT OF FRUIT BORER, HELICOVERPA ARMIGERE (HUBNER) ON CHILL)

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ABSTRACT

Studies on seasonal incidence, evaluation of *Trichogramma chilonis* Ishii, sequential application on HaNPV and Btk, exploring *Campoletis chlorideae* Uchida and testing of IPM modules for fruit borer, *H. armigera* were carried during kharif 2001 at Main Research Station, Dharwad.

Incidence of *H. armigera* along with *Sponoptera litura* Fabricius revealed that peak incidence of eggs was observed during peak flowering, September 2nd fortnight, larval incidence peaked during November 1st fortnight. Whereas, incidence of *S. litura* eggs and larvae peaked during October 1st fortnight of 2001.

Inundative release of *T. chilonis* @ 2.5 lakh/ha caused maximum egg reduction, 51.45 and 63.5 per cent, and maximum larval reduction was recorded to be 76.42 and 68.02 per cent after 1st and 2nd releases respectively. Maximum Parasitisation by *T. chilonis* was maximum (38.33%) in *T. chilonis* @ 2.5 lakh/ha. Fruit damage was less in RPP (13.66%) followed by *T. chilonis* @ 2.5 lakh/ha. Yield of green chilli was high in RPP (11.66 q/ha) followed by *T. chilonis* (11.60 q/ha). Whereas, BC ratio was 1.49 in RPP, 1.69 in *T. chilonis* @ 2.5 lakh/ha. The mean recovery of *T. chilonis* was highest (27.17%) in *T. chilonis* @ 2.5 lakh/ha.

Btk @ 2 ml /lit-HaNPV @ LE/ha-Btk @ 2 ml/lit (T₂), treatment recorded low fruit damage (9.21%). The yield of green chilli was high (14.34 q/ha) in T₂ with BC ratio of 1.93.

The number of parasitized larvae and number of cocoons constructed, increased with larval density. Whereas, the per cent parasitization and per cent cocoon construction decreased with increase in larval density. Among four pesticides tested HaNPV, Bt and Nimbecidine recorded as safer against the adults of *C. chlorideae*. The mean per cent survival of adult parasitoid after 48 hours was 60.34 per cent in carbaryl.

After three sprays fruit borer damage was reduced to 9.3 per cent with BC ratio of 1.87, 9.80 per cent with BC ratio of 1.73, 14.39 per cent with BC ratio of 1.49 in Module-I, Module-II and Module-III respectively. The Module-I and Module-II were found to be economically feasible and environmentally safe in nature.

**MANAGEMENT OF YELLOW MITE, *POLYPHAGOTARSONEMUS LATUS*
(BANKS)
(ACARI: TARSONEMIDAE) ON CHILLI**

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ABSTRACT

Field experiment were carried out to study the influence of organics, new acaricides, insect growth regulator, botanicals, bioagents and to study the synergistic effect of some plant oils with dicofol against yellow mite, *Polyphagotarsonemus latus* (Banks) infesting chilli, during *kharif* 2001 at Main Research Station, University of Agricultural Sciences. Dharwad.

Application of organics, viz., neem cake, in situ green manuring with sunhemp and vermicompost in combination with 50 per cent recommended dose of fertilizer (RDF) proved to be best in reducing mite population and leaf curl. These also promoted growth and yield parameters and recorded higher dry chilli yield, comparable to standard check, dicofol + 100 per cent RDF.

The acaricides, dicofol and fenpyroximate retained the effectiveness against yellow mite up to 21 days and were equally effective in reducing in mite population and leaf curl. Dicofol treatment significantly increased the number of branches and fruits per plant and recorded highest dry chilli yield (3.64 q/ha) followed by fenpyroximate (3.23 q/ha). Botanicals, viz., NSKE, *C. inermis* and *V. negundo* leaf extracts 5% were moderate in their efficacy. Whereas bioagents, *V. lecanii* and *P. fumosoroseus* and insect growth regulator, buprofezin were ineffective as indicated by poor population reduction and eventual yield.

Castor oil that recorded least mite population and leaf curl index emerged as the best synergist with dicofol in reducing yellow mite with highest dry chilli yield (3.04 q/ha). Honge oil and neem oil also synergised dicofol and were next only to castor oil.

Botanicals and bioagents were found to be safe to the natural enemies, viz., coccinellids and *Amblyseius* spp. in chilli ecosystem. However, *V. negundo* was slightly toxic to *Amblyseius* spp. compared to other plant extracts. Among the acaricides fenpyroximate was less toxic compared to dicofol, propargite and ethion.

**ECOSYSTEM MANIPULATION IN SOYBEAN AND GROUNDNUT TO ENHANCE
THE EFFICACY OF *NOMURAEA RILEYI* (FARLOW) SAMSON AGAINST
SPODOPTERA LITURA (FABRICIUS)**

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ABSTRACT

The effect of ecosystem manipulation in soybean and groundnut to enhance the efficacy of *Nomuraea rileyi* against *Spodoptera litura* was studied during kharif 2001 at the Main Research Station, University of Agricultural Sciences, Dharwad. In both the crop ecosystem (Soybean and groundnut early and normal sowing with closer spacing recorded higher per-cent mycosis due to *N. rileyi* (40.7% and 45.20% in soybean, 61.68% and 53.75% in groundnut, respectively), normal sown crops obtained higher yield compared to late sown crop (14.09 q/ha and 18.67 q/ha in soybean and groundnut). Giving irrigation to groundnut at peg formation stage enhanced the disease incidence by *N. rileyi* on *S. litura* (32 to 54 %) with considerably higher yield (46.82 q/ha) as compared to unirrigated groundnut.

Nomuraea rileyi (2 g/l) and NSKE sprays (5%) proved next best to the quinalphos (0.05%) spray in reducing the larval population and leaflet damage with higher yield compared to control. Irrespective of the plant protection, the larval population and leaf let damage was less in Dh-53 where as higher larval population and leaflet damage was recorded in JL-24. The genotype Dh-53 has recorded higher mycosis due to *N. rileyi* compared to other genotypes.

Spodoptera litura reared on cabbage and castor found more susceptible to *N. rileyi* by recording lesser LT₅₀ values (140.86 h and 149.32 h) as compared to other host plants.

Spraying of *N. rileyi* @ 1×10^{11} /ha was most effective in soybean and groundnut on large scale in reducing larval population to the extent of 28 and 62 per cent in soybean, 33 and 77 per cent in groundnut after first and second spray respectively. The yield obtained in *N. rileyi* spray was on par with chemical control and net return was almost four times more than insecticidal spray.

STUDIES ON POD BORER COMPLEX OF GREENGRAM WITH SPECIAL REFERENCE TO *APION AMPLUM* (FAUST) (COLEOPTERA : APIONIDAE)

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ABSTRACT

INVESTIGATIONS on the biology, survey, seasonal incidence, crop loss estimation, screening of germplasm lines and management of *A. amplum* and other pod borers were carried out during *kharif* 2001.

The biology of the pest was studied in detail under laboratory conditions. The incubation period, larval period and pupal period were 3-5, 12-16 and 7-9 days, respectively. Female lived for 34.4 days compared to male (24.2 days). The preoviposition period and oviposition period were 5-7 and 3-5 days, respectively. The egg laying capacity of female varied from 9-16.

Survey for the pest status of *A. amplum* was carried out in five taluks of Northern parts of Karnataka. The maximum per cent pod and seed damage was recorded in Bailhongal taluk (48.30 and 61.50, respectively). whereas in Chincholi taluk of Gulbarga district, pest was not observed.

Studies on the seasonal incidence of the pod borers on greengram revealed that except *H. armigera* all other pod borers viz., *A. amplum*, *C. ptychora* and *M. testulalis* on greengram was in its activity on the crop sown during first fortnight of July, which recorded highest per cent pod and seed damage. The per cent loss in yield due to pod borers was to the extent of 62.50 in the untreated check compared to completely protected crop with three sprays of methyl parathion.

Of the 30 germplasm lines evaluated against *A. amplum* attack, M-68, m-219, LM-18, M-102 and 605 were found resistant. The morphological characters like high pubescence on pod and maximum pod diameter contributed for higher resistance.

The evolution of botanicals and bioagents under field conditions revealed that among the neem derivatives nimbecidine recorded highest B:C ratio of 2.91, while fenvalrate dust recorded highest B:C ratio of 3.45 among all the treatments.

STATUS OF PADDY INSECT PESTS AND THEIR NATURAL ENEMIES IN TUNGABHADRA PROJECT AREA

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ABSTRACT

The present study was undertaken on the status of paddy insect pests and their natural enemies and was carried out in Tungabhadra Project area during 2001-2002.

Fixed plot survey in five locations of Tungabhadra Project revealed that a total of 12 insect pest findings on paddy crop. Out of these brown plant hopper, white backed plant hopper followed by leaf folder in isolated patches were recorded as major pests. Whereas horned caterpillar skipper stem borers thrips climbing out worm and green leaf hopper were recorded as minor pests and the rice hispa caseworm and grass hopper were recorded as negligible pests. Among the natural enemies spiders and mirids were most important predators of the rice pests as they occurred in considerable number when compared to others.

Studies on the seasonal incidence of paddy insect pests revealed that paddy thrips confined to only nursery stage of the crop during the month of July, the leaf folder incidence commenced from September onwards and reached peak during November, rice skippers and *Melanitis* were found attacking during tillering stage (October) and paddy climbing cutworm was observed damaging rice at pre-harvest stage.

Among the sucking pests population of green leaf hopper was found throughout the crop growth (but below economic threshold level). Whereas, plant hoppers (brown plant hopper and white backed plant hopper) were noticed from October till harvest of the crop. The activity of spiders was found throughout the crop growth and that of mirids from October till harvest.

Correlation studies made between the major paddy insect pests with various biotic and abiotic factor revealed non-significant correlation with abiotic factors and significant positive correlation with biotic factors like spiders and mirids.

USE OF INSECTICIDES IN COMBINATION WITH OILS FOR THE MANAGEMENT OF SPIRALING WHITEFLY, *ALEURODICUS DISPERSES* RUSSELL ON GUAVA

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ABSTRACT

Investigation on the efficacy of insecticides alone and in combination with oils both under field and laboratory conditions and the effect of insecticides on oviposition inhibition and LC₅₀ of different insecticides to *Alurodicus disperses* under laboratory condition were carried out at Main Research Station, University of Agricultural Sciences, Dharwad during 2001-2002.

Dimethoate was proved to be the best insecticide both under laboratory and field conditions and was excellent in ovipositional inhibition, ovicidal action and recorded more than 90, 96 and 94 per cent egg, nymphal and adult reduction under field condition at 15 days after spray, respectively. It was also found to be effective against resistant pupal stage of the pest. Dichlorvos (0.105%) was next best insecticide. However, it recorded least LC₅₀ value of 14.09 ppm for adults, while the LC₅₀ of triazophos and dimethoate were 20.48 and 22.07 ppm, respectively, thiamethoxam proved to be more effective against nymphs, while methomyl and profenofos were more effective against eggs and diflufenthiuron was excellent against both nymphs and eggs.

Among the combination of insecticides at their half doses with oils, FORS and neem oil combinations were proved to be better compared to cotton seed oil and linseed oil. However, dimethoate + FORS was found to be promising with more than 80 per cent mortality of eggs and adults and more than 70 per cent mortality of nymphs and pupae under field condition. Unlike in laboratory condition, all the combinations tested under field condition lost their toxicity early compared to insecticides alone at full dose, whereas under laboratory condition they were better than insecticides alone. *Thiamethoxam* and *diflufenthiuron* with FORS were also found effective. Different stages of *A. disperses* were vulnerable to insecticides in the order of nymphs > adults > eggs > pupae.

IMPACT OF BEE POLLINATION ON ONION SEED PRODUCTION

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ABSTRACT

STUDIES were made on pollinator fauna of onion, foraging activity of bees in onion ecosystem, effectiveness of different bee attractants in attracting the bees and effect of bee pollination on quantitative and qualitative parameters on onion seed at two locations viz., Kurabagatti and Main Research Station, University of Agricultural Sciences, Dharwad, during rabi season of 2001. Among four groups of pollinators, Hymenoptera was most prominent constituting 90.15 per cent, followed by Diptera (6.63%), Lepidoptera (1.70%) and others (1.52%).

Foraging activity of different bee species varied. However, peak activity of *A. dorsata*, *A. florea* and *T. iridipennis* were observed at 1000 hr to 1600 hr, whereas *A. cerana* was more active at 0800 hr to 1000 hr and 1600 hr to 1800 hr.

Spraying of cacambe (10%), jaggery (10%) had significant influence in attracting more number of pollinators, consequently, significantly more number of seeds (968.95 seeds/umbel Vs 584.33 and 428.00 seeds/umbel in open pollination without spray and caged plot without bees, respectively) and field seeds (34.63 seeds/umbel) was recorded in the treatment with cacambe (10%) significantly lowest chaffy seeds of 54.33 was recorded in treatment with cacambe (10%). Significantly highest test weight (4.32 of as against 2.72 and 2.17 g in open pollination without spray and caged plot without bees respectively) and yield (1.46 kg/plot as against 1.06 and 0.65 kg/plot in open pollination without spray and caged plot without respectively) were obtained in the treatment with cacambe (10%). Thus there was an increase of 36.72 and 122.02 per cent in yield over open pollination without spray and caged plot without bees respectively.

However, cacambe (10%), jaggery (10%), Bee-Q (1.25%) and sugar solution (10%) improved the germination to the extent of 88.33 to 93.33 per cent as against 80.00 and 71.67 per cent in open pollination without any spray and caged plot without bees respectively. The root length was maximum in the treatments with cacambe (10%), jaggery (10%) and Bee-Q (1.25%). Similar trend was obtained with respect to root length.

BIO-DEGRADATION OF SOME AGRO-INDUSTRIAL WASTES USING EARTHWORM, *EUDRILUS EUGENIAE* (KINBERG)

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ABSTRACT

Investigations on the bio-degradation of some agro-industrial wastes using earthworm, *Eudrilus eugeniae* (Kinberg), influence of different feeding additives on the degradation process and nutrient analysis of vermicompost samples were undertaken at the Main Research Station, University of Agricultural Sciences, Dharwad, Karnataka during 2001-2002.

Different agro-industrial wastes such as pressmud, bagasse, coir waste, groundnut shell and rice husk were used in the experiment. Faster multiplication of worms and eventual recycling of wastes into vermicompost were observed in pressmud. Bagasse and coir waste were intermediate in their acceptability to earthworms. Conversely, groundnut shell and rice husk proved undesirable agro industrial wastes, which took significantly longer period for degradation. The treatment pressmud 50% + cowdung 50% supported higher number of cocoons, non-clitellate, clitellate worms and vermicompost production. Pressmud and biogas spent slurry proved as better substrates for degradation of distillery waste. The treatment distillery waste + pressmud + cowdung 40% encountered higher production of cocoons, non-clitellate, clitellate worms and vermicompost production.

Different feeding additives were tested for degradation of agro-industrial wastes like groundnut shell and rice husk which were found undegraded in the field experiment. Among the different additives tested, rice bran and wheat bran proved as good additives along with the palatable substances like cowdung and paddy straw. Mango leaf powder and gram husk were moderate in their effectiveness. Fermentation yeast sludge proved as least preferred additive for earthworms. Higher number of cocoons, non-clitellate, clitellate worms and vermicompost production was noticed in the treatment – groundnut shell 75% + paddy straw 25% + rice bran 2% being next to the standard check. However, the treatment – groundnut shell + fermentation yeast sludge 1% proved as undesirable waste – additive combination. Similar trend was also observed in rice husk also.

There was a considerably higher levels of macro and micronutrients recorded in the vermicompost samples prepared from different agro-industrial wastes compared to their initial levels.

**EVALUATION OF BOTANICALS FOR THE MANAGEMENT OF SPIRALING
WHITEFLY, *ALEURODICUS DISPERSUS* RUSSELL (HOMOPTERA :
ALEYRODIDAE) ON GUAVA**

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ABSTRACT

Investigations on the evaluation of botanicals for the management of spiraling whitefly, *Aleurodicus dispersus* Russell both under laboratory and field conditions were undertaken in the Department of Agricultural Entomology and New Orchard, Agricultural College Dharwad, During 2001-2002.

Of the aqueous and acetone extracts of 11 botanicals tried under laboratory conditions maximum egg mortality was induced by both extracts of *Azadirachta indica* A. Juss seeds. Acetone extract of *Annona squamosa* L. seeds and *Allium sativum* L. bulb. Acetone extracts performed better than their corresponding aqueous extracts as ovicides and larvicides. The most promising larvicides were extracts of *A. indica*, aqueous extracts of *A. squamosa* and *Thevetia nerifolia* Juss Et. Steud leaves and acetone extract of *Clerodendron inerme* G. leaves.

Studies on the ovipositional repellent properties of botanicals indicated that acetone extracts of all the botanicals were more effective than the respective aqueous extracts as ovipositional repellents. Acetone extracts of *Acorus calamus* L. rhizome, *Adathoda vasica* Nees leaves, *A. sativum*, *A. indica* and *C. inerme* prevented egg laying upto 15 days. Among aqueous extracts, *A. sativum* was most effective followed by *A. indica*.

Among 10 promising botanical extracts evaluated under field condition, both extracts of *A. indica*, *A. sativum* and aqueous extract of *A. squamosa* were most effective against all the development stages of spiraling whitefly. Extracts of *A. sativum*, *A. indica* and *A. squamosa* were the most effective against eggs so also in reducing larval population. Extracts of *A. indica* were much effective in reducing the pupae. Extracts of *A. sativum*, *A. indica*, *A. squamosa*, acetone extracts of *Vitex negundo* L. *C. inerme*, *T. nerifolia* and aqueous extract of *C. inerme* were effective in bringing down adult population. Population of the predator, *Mallada astur* (Banks) was not affected by the botanicals unlike the chemical check, triazophos.

UTILIZATION OF BIOAGENTS IN THE MANAGEMENT OF CASTOR SEMILOOPER, *Achaea janata* L.

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ABSTRACT

Investigation were carried out during 2001 at the Main Research Station of the University of Agricultural Sciences, Dharwad to study the infectivity of microbials on castor semilooper, *Achaea janata*, to evaluate the different adjuvants in improving the efficacy of granulosis virus, to study the safety of *Nomuraea rileyi* to parasitoids and honey bees.

In the laboratory the UAS DWD strain of *Bacillus thuringiensis* at 2×10^8 spores per ml on different instar gave higher larval mortality.

N. rileyi and *Beauveria bassiana* at 2×10^8 conidia/lit were also found to be infective to larvae of *A. janata*. Whereas *Metarhizium anisopliae* and *Verticillium lecanii* were found to be ineffective on the different instars of *A. janata*.

The study of evaluation of different adjuvants in improving the efficacy of GV on second instar larvae of *A. janata* indicated that boric acid @ 0.1% with GV @ 2×10^9 Obs/ml is the best followed by jaggery @ 0.05%. In fourth instar, jaggery @ 0.5% gave better results than acid @ 0.1%. Soya milk @ 1% and starch @ 0.2% showed promise which could be used along with GV as alternative adjuvants, Butter milk 1% and vegetable oil 1% did not improve the efficacy of GV.

Field studies on castor in the management of *A. janata* showed that profenophos @ 1 ml/lit followed by Nimbecidine 0.03% was the best treatment in reducing larval population, foliage and recording higher yield of castor. The fungi *N. rileyi*, *B. bassiana*, *M. anisopliae* and *V. lecanii* were ineffective in reducing the larval population.

The fungus *N. rileyi* @ 2×10^8 conidia/lit was safe to the larval parasitoid, *Microplitis maulipinnis* and honey bees, *Apis cerena indica*.

HOST PLANT RESISTANCE STUDIES ON SUCKING INSECT PESTS OF GROUNDNUT

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ABSTRACT

Studies were under taken at College of Agricultural and Regional Station, Raichur during 2001-2002 on various aspects to know the sources of resistance against leafhoppers and thrips.

Screening was carried out for two seasons kharif-2001 and rabi-summer 2001-02. Genotypes viz., NCAc-343 ICG-5240, Dh-8, ICGV-90262, ICRGV-91116, and varieties viz.,

GAGC-10, M-13, M-197, M-522, and JSSP-10 were found to be resistant to both the sucking pest. Genotypes viz., ICGV-87165, ICGV-96196, ICG-1440, ICHNG-88448B, R-8972 and varieties Dh-3-30, MH-2, ICGV-86590, GG-13, RG-141, Chandra, Chitra, Spanish-Improved and R-8808 were moderately resistant to both sucking insect pests.

Under caged condition ICG-7237 TMV-2 were the highly susceptible entries harbouring the maximum number of leafhoppers and thrips eggs and supported their development and survivability while CSMG-84-1 ICGV-86522 and NCAc-343 received minimum number of eggs followed by ICG-5240 M-13 and ICGV-86522.

Among the various morpho-features studied the resistant and moderately resistant entries recorded significantly higher midrib hairs with more length and had negative relationship with population and damage of both sucking pests. Leaf thickness had significant and positive relationship with thrips damage alone. Though the leaf color was negative and non-significant, most of the resistance and moderately resistant entries had either dark green or green coloured leaves. Among the various biochemical constituents analysed, phenols and tannins had significant and negative relationship with damage, oviposition and survivability of both the sucking pests. The total sugar content had significant and positive relationship with leafhopper survivability, while in case of thrips similar relationship was noticed both with oviposition and survivability. The amino acid content had significant and positive association only with thrips survivability.

Stepwise regression analysis revealed that higher tannins and midrib hair length were the major contributing factors for resistance against leafhoppers, while tannins, midrib hair length and leaf thickness were predominant factors against thrips resistance

SURVEY AND MANAGEMENT OF INSECT AND MITE PESTS OF *JASMINUM* SPP.

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ABSTRACT

Investigation on various aspects Viz., survey, seasonal incidence and management of jasmine insect and mite pests was undertaken at the Department of Entomology, College of Agricultural and Regional Research Station, Raichur Karnataka, during 2001-2002.

Survey revealed that, bud borer, blossom midge and two-spotted spider mite were serious pests of *Jasminum sambac*. *J. multiflorum* affected more by bud and shoot worm, while, *J. auriculatum* affected greatly by eriophyid mite.

Seasonal incidence of major insect and mite pests of *J. sambac* revealed that, bud borer incidence was more during May (23.16%)- July (9.62%), which was the peak flowering period. While, two spotted red spider mite occurred throughout the year. Leaf webworm and shoot webworm incidence was more from May to November. Influence of weather parameters on bud borer was significant but, extent of influence was low, while, high with leaf webworm and shoot webworm. Red spider mite population was negatively correlated with rainfall.

Seven species of spiders were found to predate on lepidopteran pests of jasmine, whereas, ladybird beetle and mired bug were recorded to predate on two spotted spider mite. *Bracon* sp. *Chelonus* sp. *Elasmus* sp. *Brachymeria* sp. and unidentified Ichneumonid were Parasitoids of leaf webworm. Unidentified Scelionid, *Bracon* sp. and *Phenarotoma* sp. were found to parasitise the bud and shoot worm, shoot webworm and bud borer, respectively. *tetrastichus* sp. and *Systasis* sp. were found to parasitise the blossom midge.

Superior control of eriophyid mite on *J. auriculatum* was achieved with carbofuran + Oxydemeton methyl treated bushes recording lowest infestation of 24.70 per cent, followed by carbofuran + neem oil and carbofuran alone treated bushes.

Monocrotophos and oxydemeton methyl were most effective in controlling the blossom midge and reduced the incidence by 80.59 and 77.69 per cent over control respectively, after 14 days of application.

Indoxacarb (0.0073%) and spinosad (0.023%) were best chemicals of control the bud borer, followed by pyrethroids.

BIO-ECOLOGICAL LOSS ESTIMATION AND MANAGEMENT OF DUSKY COTTON BUG *OXYCARENUS LAETUS* KIRBY (HEMIPTERA: LYGAEIDAE)

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ABSTRACT

STUDIES were under taken at College of Agriculture and Regional Research Station Raichur during 2001-2002 on various aspects of *Oxycareenus laetus* Kirby on cotton indicated that the transparent, light yellow oval, cigar shaped eggs were laid either singly or in groups of two to ten in the lint of half opened bolls or on seeds and lint of fully opened bolls. The bug had five nymphal instars with a mean nymphal duration of 18.64 ± 0.85 days. Adults are small flat with pointed head and dusky brown wings. The females are found to live longer than males. The total life cycle of male and female was 38.95 ± 4.63 and 41.10 ± 4.30 days, respectively with the fecundity of 25 to 40 eggs at room temperature.

The peak incidence on off season cotton was during third week of July (49.56 bugs/boll). In normal sown cotton the incidence was noticed during first week of December with peak incidence in first week of April (46.96 bugs/boll) whereas, in dry land cotton infestation reached its peak during the fourth week of March (16.92 bugs/boll). The incidence had significant positive relationship with maximum and minimum temperature.

Dusky cotton bug was also noticed on Indian mallow bhendi, tulip tree, curry leaf, groundnut, jasmine, pathenium, tridax wild cherry neem pundi and sunflower during May and November. Unidentified ectoparasitic mite and other unidentified egg parasitoid were recorded with their peak activity during February.

Studies on estimation of loss due to Dusky cotton bug indicated significant variation in all quantitative and qualitative parameters of cotton when the bug population was 30 pairs and above per boll.

Among the different insecticides evaluated monocrtophpos 36 SL at 700g.a.i. per ha, carbaryl 50% WP at 2000g.a.i per ha and acephate 75 SP at 750 g.a.i per ha were found to be most effective and recorded higher seed cotton yield.

SEASONAL INCIDENCE AND MANAGEMENT OF *HELOPELTIS ANTONII* SIGNORET ON GUAVA

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ABSTRACT

Investigations were undertaken during 2001-02 at the College of Agriculture, Dharwad and Navalur locations for seasonal incidence and management of *Helopeltis antonii* on guava. The survey carried out at MARS, Dharwad on two guava cultivars for seasonal fluctuations of *H. antonii* indicated that the pest incidence was at its peak during October both on young leaves (18.81%) and fruits (21.87%) of Cv. L-49. On Cv. Navalur local the peak incidence was observed during September on young leaves (17.56%) and during November on fruits (61.79%).

At Navalur location on Cv. L-49 the pest incidence was at its peak during September (23.50%) on young leaves and fruits (31.51) whereas on Cv. Navalur local the maximum incidence was observed during September on young leaves (18.18%) and on fruits (22.42%) during August. However, no incidence was noticed on flower buds on both the cultivars at both the locations.

The observations on natural enemies of *H. antonii* at Dharwad location, indicated that four spider species were found predating on adults and nymphs of *H. antonii* viz., *Plexippus paykullii* (aud.), *Rhene khandalaensis* Tikader., *Lycosa* sp. and *Cheiracanthium* sp. under guava ecosystem.

In an infectivity test mycopathogens viz., *Beauveria bassiana*, *Verticillium lecanii* and *Metarhizium anisopliae* were infective to *H. antonii* (nymphs + adults) by recording 100.00, 76.07 and 47.80 per cent mortality of bugs, respectively at ninth day after inoculation. However, *Nomuraea rileyi* was non pathogenic of *Helopeltis antonii*.

A field study on efficacy of chemical and botanical insecticides against *H. antonii* was undertaken on 33 years old guava (Cv. L-49). The treatment endosulfan 35 EC (2 ml/l), dimethoate 30 EC (1.7ml/l), nimbecidine 0.03 EC (5 ml/l), neem oil 2% and fenvalerate 20EC (0.5ml/l) were found equally effective by recording significantly least per cent damage on leaves and fruits. These treatments also recorded maximum number of healthy fruits, minimum number of scabby fruits and higher cost benefit ratio expecting the treatment fenvalerate. The NSKE 5% (50 g/l) and malathion 5D (25 kg/ha) were the next best insecticides in controlling *Helopeltis antonii*. The least effective treatments were fenvalerate 0.4D (25 kg/ha), pongamia oil 2% and *Vitex negundo* (50 g/l) 5 per cent.

BIO-ECOLOGICAL MANAGEMENT OF *HELICOVERPA ARMIGERA* (HUBNER) ON SORGHUM

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ABSTRACT

Investigations on seasonal incidence, natural enemies, screening of sorghum genotypes, effect of intercropping systems for multiplication of *N. rileyi* and management of *H. armigera* were undertaken at Main Research Station, University of Agricultural Sciences, Dharwad during 2001.

The incidence of sorghum earhead caterpillar was confined to kharif season. The peak incidence of *H. armigera* (2.50 larvae / earhead) was observed during first week October.

The peak activity of egg parasitoid, *T. chilonis* was during September fourth week (57.0%). Among the larval parasitoids, *C. chlorideae* was predominant with its peak activity observed during first week of October (32.5%). The overall larval parasitoid peak activity (18.88%) was during first week of October. Among four different predators, *C. cornea* and *C. sexmaculata* were predominant.

Among fifteen sorghum entries, CSH-14 and SVD-6906 were found resistant to *H. armigera* by recording $X-2\sigma$ to $X-\sigma$ (0.45 and 0.52) larva per earhead as well as lowest grain yield loss $X-2\sigma$ to $X-\sigma$ (5.34 and 6.52%).

Sorghum intercropped with groundnut and soybean favoured significantly lower larval population by recording higher per cent mycosis of *N. rileyi* (38.73 and 36.04%) and maximum sorghum grain equivalent yield of 44.72 and 43.39 q/ha, respectively over the sole sorghum (36.50%).

Among biorationals and one insecticide tested against *H. armigera*. Endosulfan 35 EC (0.04%) was found superior in reducing 76.0 per cent larval population followed by *N. rileyi* sequential spray with NSKE (66.0%). Significantly superior grain yield was recorded in endosulfan 35 EC (48.07 q/ha), which was on par with *N. rileyi* (1 g/l) – NSKE (5%) recording 45.33 q/ha grain yield.

Among the different dust tested, malathion (5%) emerged as a superior in reducing 72.0 per cent population of earhead caterpillar with grain yield 49.60 q/ha, which was on par with NSK dust with grain yield of 44.83 q/ha

X

CROP PERFORMANCE OF NEW HYBRIDS OF SILKWORM, *BOMBYX MORI* L. IN TRANSITIONAL ZONE OF NORTH KARNATAKA

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ABSTRACT

The rearing performance of newly evolved multivoltine x bivoltine and bivoltine x bivoltine silkworm hybrids were studied over seasons by using M-5 and V-1 mulberry varieties under Dharwad condition. The overall rearing performance of multivoltine x bivoltine hybrids reveals the superiority of MH-1 x NB₄D₂, BL-23 x NB₄D₂ and BL-24 x NB₄D₂ hybrids over Pure Mysore x NB₄D₂. Among the hybrids, MH-1 x NB₄D₂ was significantly superior in chawki larval weight (1.66 g/10 larvae), full grown larval weight (37.56 g/10 larvae), ERR (82.70%), pupal weight (15.47 g/10 pupae), cocoon weight (18.78 g/10 cocoons), cocoon yield /10,000 worms (15.54 kg), cocoon filament length (993.99 m) and also recorded least flacherie disease (11.99%). The fifth instar larval duration (175.83 h), total larval duration (597.83 h), silk productivity (4.68 g/day), shell weight (3.38 g/10 shells), shell ratio (18.79%) and renditta (7.99) were significantly superior in BL-23 x NB₄D₂ hybrid as compared to other hybrids.

Similarly, among the bivoltine x bivoltine hybrids, CSR hybrids viz., CSR-4 x CSR-2, CSR-2 x CSR-4 and CSR-18 x CSR-19 were significantly superior over KSO-1 x NP-2 and NP-2 x KSO-1 hybrids in all the economic traits studied. Among the CSR hybrids, CSR-4 x CSR-2 was significantly superior in matured larval weight (37.72 g/10 larvae), fifth instar larval duration (161.50 h), cocoon weight (17.37 g/10 cocoons), shell weight (3.70 g/10 shells), cocoon yield/10,000 worms (14.15 kg) and cocoon filament length (1192.50 m). while, CSR-18 x CSR-19 was superior in chawki larval weight (1.69 g/10 larvae), total larval duration (572.15 h), ERR (81.75%) and in denier (2.48) and also recorded least muscardine disease (2.07%). The CSR-2 x CSR-4 hybrid recorded highest silk productivity (5.15 cg/day), cocoon shell ratio (21.70%) and lower renditta (6.13) as compared to other hybrids. Further, KSO-1 x NP-2 recorded least flacherie disease (13.04%). The grasserie disease was significantly least in NP-2 x KSO-1 (2.60%) as compared to other hybrids.

Among the mulberry varieties, V-1 was found to be significantly superior over M-5 in increasing the values of all the economic traits, except chawki larval weight, fifth instar and total larval duration and were better in all the multivoltine x bivoltine and bivoltine x bivoltine hybrids fed with M-5 variety. Further, winter season was found to be most favourable for rearing all the multivoltine x bivoltine and bivoltine x bivoltine hybrids followed by rainy and summer season.

STUDIES ON FEEDING METHODS AND FREQUENCIES ON V-1 HYBRID MULBERRY

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ABSTRACT

Victory-1, the newly evolved hybrid mulberry was evaluated for rearing performance of the Mulberry silkworm, *Bombyx mori* (L.) (NB₄D₂) by adopting different feeding methods and frequencies at Department of Sericulture, College of Agriculture, University of Agricultural Science, Dharwad, Karnataka, during 1999-2001. V-1 incidence as compared to S₃₆. Larvae reared on V-1 consumed significantly more food than S₃₆. V-1 was superior to S₃₆ with respect to weight of 30 worms just before settling for third moult, maximum fifth instar ten larval weight, cocoon weight, shell weight shell percentage, pupal weight, moth emergence, fecundity, hatching percentage, single cocoon bave length, silk filament weight, cocoon yield by number, cocoon yield/kg, denier, renditta and ERR. The cost benefit ratio was higher with V-1 than S₃₆.

Among the feeding methods shoot rearing effected significantly lower total larval duration, lesser pupal duration and lower disease incidence as compared to shelf rearing. Shoot rearing method induced more feeding than shelf rearing. Shoot rearing recorded significantly higher weight of 30 worms just before settling for third moult, maximum fifth instar ten larval weight, cocoon characters, pupal weight, grainage parameters, silk characters, ERR and cocoon yield. The cost benefit ratio was higher in shoot rearing method than shelf rearing method.

Of the various feeding frequencies four feds recorded significantly lower total larval duration, lesser pupal duration and lower disease incidence than single feed per day. Significantly higher leaf consumption was recorded in four feeds while one feed recorded lesser leaf consumption: Four feed frequency effected significantly highest weight of 30 worms just before settling for third moult, maximum fifth instar ten larval weight, cocoon character, pupal weight, grainage parameters, silk characters, ERR and cocoon yield. However, based on the results of the present investigation irrespective of the varieties used three feed frequency is equally economical to that of four feeds particularly in areas of labour shortage.

STUDIES ON VARIABILITY PRE-AND POST HARVEST OF EARLY BLIGHT (EII AND Martin) JONES and GROUT) OF TOMATO

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ABSTRACT

A field survey conducted in Northern district of Karnataka revealed maximum severity of the disease in Raichur district followed by Dharwad and Gulbarga districts. *Alternaria* fruit rot was maximum during September month, which was positively correlated with relative humidity and rain fall while least incidence was recorded during April and May during the survey of vegetable market at Raichur.

Five isolates of *A. solani* obtained from Raichur {tomato (AS₁) and brinjal (AS₅)}, Bangalore (AS₂), Gulbarga (AS₃) and Dharwad (AS₄) district varied significantly with regards to various parameters of variability. Biodiversity of five *A. solani* isolates pinpointed that AS₂ isolate was highly virulent on the cultivars tested, producing abundant sporulation at normal range of temperature (25-30°C) and high humidity levels (95-100 %) with good response to alternate light and darkness for sporulation, highly toxin producing and thus proved to be a very typical of highly virulent nature. RAPD-PCR analysis using ITSF₃ as forward primer and ITSR₄ as reverse primer also conforms AS₂ isolate as hypervariable.

Genotypes *viz.*, Arka Alok, Arka Abha, Arka Meghali Arka Sourabh, IIHR-305, IIHR-308, IIHR-2266, IIHR-2285 and IIHR-2288 showed resistant reaction at pre-harvest stage, while four for the genotypes, Arka Alok, Arka Ashish LE-155 and IIHR-2285 showed resistant reaction in post-harvest stage, proving Arka Alok and IIHR-2285 to be resistant at both the stages.

The fungicides *viz.*, iprodione and mancozeb among non-systemic and thiophanate methyl among systemic fungicides were very effective in inhibiting the growth of *A. solani* both in vitro and in vivo. Whereas garlic bulb extract and Prosopis leaf extract showed considerable amount of inhibition on growth of *A. solani*.

Pre-harvest sprays of iprodione and mancozeb showed reduced post-harvest incidence of *Alternaria* fruit rot. Post-harvest treatments *viz.*, iprodione, mancozeb, wax coating and Prosopis leaf extract had decreased per cent loss in weight (PLW), acidity and increase TSS in addition to reducing the *Alternaria* fruit rot.

HISTOLOGY AND BIOCHEMICAL STUDIES ON MOSAIC COMPLEX OF CHILLI (*CAPSICUM ANNUUM* L.)

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ABSTRACT

Chilli (*Capsicum annuum* L.) is one of the important and widely grown vegetable crops in Karnataka and is the major producer of chilli in India. Chilli mosaic complex caused by several viruses is the most serious disease complex among various diseases of chilli. Survey conducted in TBP area indicated the occurrence of mosaic disease in almost all parts of Bellary, Hospet, Raichur and Sirguppa taluks. The incidence of chilli mosaic complex ranged from two per cent (Honnahalli and Sirguppa taluks) to 29 per cent (Mallareddy camp of Bellary taluk).

The chilli leaves infected with chilli mosaic complex were assayed for ELISA test. Based on DAS-ELISA absorbances the mosaic disease of chilli is associated with cucumber mosaic virus (CMV), however, other viruses i.e., PLRV, PVX, PVY, PVM, PVS were not detected.

Histopathological studies indicated that distortion in cellular organization of the tissue in mosaic and ring spot infected leaves and also most of the palisade cells lost their shape, colour etc. further, histochemical studies indicated that polysaccharides, proteins and nucleic acids were reduced in CMV infected plants while nucleic acid content was increased with decrease of polysaccharide and protein in ring spot infected leaves.

Studies on pollen sterility due to virus infection showed there was decrease in total pollen with increased abnormality and sterility percentage with mosaic infection.

The biochemical analysis of diseased leaves indicated decrease in sugars with increased phenol content than the healthy leaves. Studies on managemental aspects showed that the crop could be protected from incidence of disease by spraying combination of insecticide, Acaricide and plant extract (seedling dip with confidor + two sprays of confidor and sorghum leaf extract + a spray of vertimac) at 20, 40 and 60 days after transplanting.

Among the fifty genotypes screened against chilli mosaic complex disease under irrigated conditions none of the line were found to be immune. Only four lines were resistant viz., KSDA-210-10, LCA-305, LCA-324, Hissar Vijay.

ANTHRACNOSE OF MANGO CAUSED BY COLLETOTRICHUM GLOEOSPORIODES (PENZ.) PENZ. AND SACC. AND ITS MANAGEMENT

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ABSTRACT

Anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) and Sacc. is a major disease of mango. Two years survey revealed that cv. Totapuri showed more Percent Disease Index (PDI) compared to Swarna jahangir. Maximum PDI was noticed in Kolar (22.44) followed by Raichur (16.40). The fungus on Potato Dextrose Agar (PDA) produced grayish to white mycelium with pink sporulation. Among six isolates *C. gloeosporioides* Raichur isolates (RCR) was highly virulent on the tested cultivars and produced abundant sporulation at temperature of 25-30⁰ C and relative humidity of 95-100 percent with good response to alternate light and darkness. Further, it produced more amount of toxin, while KLR-2 produced lesser amount of toxin.

All six isolates of *C. gloeosporioides* exhibited diversity in cultural characters with maximum growth on PDA malt extract agar and Asthana and Hawker's 'A' agar. The culture filtrate of six isolates *C. gloeosporioides* differed in their action to inhibit the seed germination, root and shoot elongation and incubation of phytotoxic symptoms on tomato seedlings. The diversity existing among six isolates in terms of pathogenic, cultural physiological and photoperiod requirement was established. Mallika and Alampur Beneshan were identified as slow disease progressive cultivars.

Among 21 plant species extracts screened for fungitoxic nature, *Ocimum sanctum*, *Allium satium*, *A. cepa* and *prosopis julifera* showed high inhibition (>70%) of conidial germination of *C. gloeosporioides*.

In *in vitro* and *in vivo* evaluation of fungicides against pathogen and disease showed, tricyclazole, benomyl, carbendazim hexaconazole, propiconazole, copper oxychloride and SAAF were found to be effective in managing the disease.

Pairi and Swarna jahangir cultivars showed highly susceptible reaction while Mallika and Alampur Beneshan showed moderately susceptible reaction.

PHYSIOLOGICAL AND BIOCHEMICAL BASIS OF RESISTANCE TO FOLIAR DISEASES IN WHEAT

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ABSTRACT

A study was conducted to know the disease resistance factors (Biochemical, morpho-physiological and histological components) to leaf rust, stem rust and leaf blight which are major foliar diseases of wheat.

Twelve genotypes were selected for present investigation. Among them DWR-2006, DWR-1006, DWR-225, DWR-185 and NP-200 showed moderate resistance for leaf rust, stem rust and leaf blight diseases.

Spore germination studies indicated that conidia of *Helminthosporium sativum* and uredospores of *Puccinia recondite* and *P. tritici* germinated both on slide and on all the genotypes. In case of *P. tritici* and *P. recondite* an appressorial formation was on stomata indicating the passive type of penetration where as, in case of *H. sativum* formation of appressorium was near the stomata indicating active penetration. In biochemical studies, resistant genotypes recorded high amount of sugars, phenols, ortho dihydroxy phenols, proteins, amino acids and epicuticular wax as compared to susceptible ones. In histological parameters, resistant genotypes recorded more cuticular thickness and epidermal cell layer thickness and less number of epidermal cells as compared to susceptible ones. Less number of stomata, less stomatal length and breadth showed good morphophysiological parameters for resistance.

Overall studies revealed that, higher epicuticular wax, phenols, soluble proteins, sugars, cuticular and epidermal cell layer thickness and lesser length, breadth and number of stomata are the reasons for disease resistance to foliar diseases in wheat.

USE OF PHYTOCHEMICALS IN THE MANAGEMENT OF STEM ROT OF GROUNDNUT CAUSED BY *Sclerotium rolfsii* Sacc.

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ABSTRACT

An attempt was made to study the role of plant extracts in the management of stem rot of groundnut caused by *Sclerotium rolfsii*. Among the 30 plant extracts in vitro by cold aqueous method, leaf extract of *Agave Americana* L. exhibited maximum inhibition of mycelial growth and sclerotia formation of *S. rolfsii* at 10 per cent concentration. Of 29 plant extracts evaluated *in vitro* by hot aqueous method, leaf extract of *Prosopis juliflora* (Swartz) Dc. Exhibited maximum inhibition of mycelial growth and sclerotia formation of *Sclerotium rolfsii* at 10 per cent concentration. In vitro evaluation of nine plants extracted with acetone revealed that, *A. Americana* was highly inhibitory to mycelial growth of *S. rolfsii*.

Among the root extracts of eight plants evaluated in vitro, *Eupatorium odoratum* L. was highly inhibitory to mycelial growth of *S. rolfsii*. However, root extract of *Parthenium hysterophorus* L. exhibited maximum inhibition of mycelial growth of *S. rolfsii* when extracted with hot water.

Biochemical analysis of extracts showed that leaf extract of *Prosopis juliflora* had considerably higher amount of phenols whereas *Cassia occidentalis* L. had higher amount of tannins compared to *Acalypha bicolor* L.

Leaf extract of *A. Americana* recorded cent per cent inhibition of mycelial growth of *S. rolfsii* under room and refrigerated conditions up to five days of storage at both 10 and 20 per cent concentrations.

In vivo evaluation of botanicals revealed that seed treatment with leaf extract of *A. Americana* as based formulation at 10 per cent concentration resulted in the increased emergence of groundnut plants. Highest mean percentage of healthy pods was recovered by soil application of *A. Americana* as talc based formulation at 10 per cent concentration. Seed treatment for 30 minutes in liquid suspension of *A. Americana* at 5 per cent concentration recorded highest pod yield.

HISTOLOGY, BIOCHEMICAL STUDIES AND MANGEMENT OF TOMATO LEAF CURL

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ABSTRACT

Tomato is the second most important vegetable in the world. The tomato crop suffers from various diseases caused by virus, fungi, bacteria, nematode and phytoplasma.

The survey conducted to know the severity of leaf curl disease in three districts of Northern Karnataka revealed a highest disease incidence of 88.20 per cent in Dharwad district followed by Belgaum (79.71%) and Haveri (75.48%) districts.

The virus showed detrimental effect on plant growth and yield at all the stages of infection. However, the effect was more in early stages of infection. The induced high pollen sterility (33.94%) when the plants were infected at 15 days after seedling emergence and the sterility reduced when the infection was delayed.

Out of 88 stabilized genotypes screened, only three (L-16, L- 17 and L-20) were found to be moderately resistant. The histo-chemical studies of L-16 genotype revealed that virus infection was restricted to palisade cells. The infected susceptible Megha genotype showed high structural and chemical (polysaccharides and proteins) degradation than the infected L-16 genotype.

The disease incidence was less when the nursery was protected with net as compared to carbofuran application. Among seven chemicals and four plant extracts tested, Imidachloprid (0.3 ml/1) was found to be superior in controlling vector population which in turn resulted in less disease incidence.

MANAGEMENT OF DRY ROOT ROT OF PIGEONPEA [CAJANUS CAJAN (L.) MILLSP.] CAUSED BY MACROPHOMINA PHASEOLINA (TASSI) GOID.

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ABSTRACT

PIGEONPEA is one of the major grain legume crops of Karnataka. Among the biotic stresses, dry root rot is attaining severely in pigeonpea production. Roving survey conducted during the *rabi* season of 2001 in Northern Eastern Karnataka revealed the maximum severity of the root rot in Gulbarga district followed by Raichur and Bidar. Four isolates of *M. phaseolina* obtained from ICRISAT Gulbarga Bidar and Raichur districts varied significantly with regard to cultural and physiological characters. The ICRISAT isolates maximum dry mycelia weight and the least growth observed in Raichur isolates on Potato Dextrose Broth. Potato Dextrose Agar and Czapek's agar were best for the growth and sclerotic production of the pathogen. A temperature 35⁰ C was found to be favourable for growth of the pathogen. The growth of the fungus was favored by neutral pH. Alternated cycles of light and darkness favoured the good growth and sclerotia production of *M. phaseolina* as compared to complete darkness.

The two pigeon pea genotypes PT-221 and ICPL-90097 showed resistant reaction where as DEPS-9 Gullyal local GS-1 ICPL-89049 Phy-K-2, TAT-9621 and V-50 showed moderately resistant reaction and none of them showed immune reaction in sick pot study. The bulb extract of garlic was found to be more effective in inhibiting the growth of pathogen followed by onion extract under in vitro study. The antagonist *G.virens* (PDBC TVS-2) was found to be superior in inhibiting the growth of the pathogen followed by *P. fluorescens* (PDBC Pf-1) in dual culture technique. Seed treatment along with soil application of these antagonists with talc based formulation was found to be best method. The fungicide viz., benomyl and carbendazim among systematic fungicides mancozeb and thiram among non systematic fungicides were very effective in inhibiting the growth of the fungus under *in vitro*. Pigeonpea seeds treated with benomyl and carbendazim reduced the root rot incidence and thus supported the maximum survival of plants followed by mancozeb and thiophate methyl.

MINERAL PHOSPHATE SOLUBILIZATION AND MOLECULAR DIVERSITY OF *ACETOBACTER DIAZOTROPHICUS*

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ABSTRACT

The focus of the present study was to isolate *Acetobacter diazotrophicus* from different crops, to assess their MPS activity and to characterize their molecular diversity. Twenty-four isolates were isolated from different crops. This thesis reports for the first time the presence of *A. diazotrophicus* in sesame and sweet sorghum. PCR amplification of the genomic DNA of the isolates using specific primers AD and 1440 resulted in an amplification product of approximately 410 bp confirming that all the isolates belonged to *A. diazotrophicus*. The isolate, ADM 7 had highest solubilization of TCP (38.61%). All the isolates produced organic acids of which gluconic acid was most predominant. Complete repression of MPS activity in all the isolates was noticed in presence of 30mM K_2HPO_4 and 50 mM Tris. Five MPS defective Tn_5 mutants of *A. diazotrophicus* Pal5 were obtained. Among them, four were MPS minus and one, a delayed mutant, Comparison of the mutants and the wild type with respect to phosphate solubilization indicated the presence of a direct oxidation pathway and release of H^+ to solubilized the tricalcium phosphate.

The isolates were characterized by PCR-product profiles using random Operon primers. The reference strain Pal5, formed a separate cluster diverging from all native strains at a genetic similarity value of 0.47. All 9 primers used for assessing the molecular diversity of the *A. diazotrophicus* isolates generate 78 polymorphic bands (74% polymorphism). The primer, OPO-08 had lowest minimum (0.00) and least average (0.52) genetic similarity and can be used to fingerprint *A. diazotrophicus* under consideration.

SCREENING OF WINE YEASTS AND POMEGRANATE (*PUNICA GRANATUM* L.) CULTIVARS FOR WINE PRODUCTION

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ABSTRACT

Experiments were conducted to screen efficient wine yeasts and pomegranate cultivars suitable for quality wine production. Ten yeast strains isolated were compared with reference strain of *Saccharomyces ellipsoideus* No. 101 and found that strain FWY-4 and FWY-6 were shown to be good with respect to assimilation of different carbon sources and growth on YEPD broth. However, highest alcohol tolerance (8.3%) was exhibited by reference strain followed by FWY-4 (8.25%) and FWY-6 (7.80%).

Saccharomyces ellipsoideus No. 101 produced maximum alcohol content in wine when inoculated to Ganesha variety of pomegranate fruits but it contained least amount of tannins and esters. The wine from Kesar variety maximum. Aldehydes and proteins while Arakta wine had highest amount of NPK. The branded wines when produced by blending Ganesha wine and Arakta wine in the ratio of 2:1 showed highest acceptability with better organoleptic characteristics. However, the wine from Arakta variety alone had overall better acceptability inoculated with *Saccharomyces ellipsoideus* No. 101.

STUDIES ON MICROBIAL DECOLORIZATION OF BIOMETHANATED DISTILLERY SPENTWASH

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ABSTRACT

Microbial consortia capable of decolorization of spentwash were isolated and screened. Two promising decolorizing consortia were selected from the soil and sludge samples collected from the naturally enriched spentwash dumpsites, with a long history of discharge. Similarly, tow consortia were selected from the soil of the Western Ghats enriched with spentwash for a period of six months. One promising white-rot fungus and three yeast sludge samples were also selected. A total of 12 promising decolorizing consortia were compared for their decolorization potential at increased concentrations of spentwash. Of these, two consortia (B-218 and B-219) were the most efficient decolorizers with 61 and 59 per cent decolorization (50% spentwash). The stability of B-218 was confirmed by repeated reinoculations. The process parameters for maximum decolorzation by B-218 were optimized. The consortium B-218 consisted for four bacteria. Out of the four predominant bacteria, three were identified as *Pseudomonas* sp. and one as *Enterobacter* sp. The naturally constituted consortium was superior over any of the four bacteria, either singly or in any combination. The consortium was aerobic and required agitation. Decolorization by B-218 required an additional readily available carbon source. And, it preferred glucose to others. The optimum glucose concentration for decolorization of 50 percent concentrated spentwash was found to be 2 per cent. However, when the spentwash concentration was increased to 70 per cent, the glucose requirement was increased to 4 per cent. The best N source for decoloriation was yeast extract and the optimum concentration was 1.0 per cent. The consortium did not require any pH corrections to spentwash for decoloration. The optimum inoculation level was 2.5 per cent. The consortium B-218 was found to be operational at mesophilic conditions. The consortium B-218 was forum to be a bio-remediating agent as well, reducing phenols as well as COD. Under the optimized conditions, the consortium decolorized 50 per cent concentrated spentwash by 60 per cent, degraded phenols by 42 per cent and reduced COD by 48 per cent. Immobilization of the consortium within calcium alginate slightly increased the decolorization yields. Amongst the cheaper immobilization media tested, polyurethane foam was found to be superior over others.

PRODUCTION AND PRICE BEHAVIOR OF POTATO IN KARNATAKA STATE, INDIA – AN ECONOMIC ANALYSIS

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ABSTRACT

The study attempted to examine the production performance and price behaviour of potato in Karnataka state. Both secondary and primary data were utilized. Different growth functions, decomposition analysis, Nerlovian Price Expectation-cum-Area Adjustment mode Cobb-Douglass type of production function and ARIMA models were employed.

The analysis showed that growth in production of potato was *encouraging* in most of the districts and at state level despite there was declining performance observed in the second period as compared to the first period. The contribution of area, yield and prices to the increase in the value of outputs were found to be crucial factors in all the cases. Yield variance and area variance were found to be the most important sources to the increased instability in potato production. In addition to price factor, non-price factors also had a salutary impact in the allocation of area and production decision. Significant pure AR and MR terms in the prices of potato for Hassan district and Karnataka implied that prices of potato in the current year were influenced by its prior values and error terms of the previous year. Significant seasonal AR and MR terms suggested that the value of a particular month in the current year was affected by the prices of the corresponding month and the error terms in the previous year. Forecasted value confirmed that its price fluctuation continued at least in the short run in Hassan, Belgaum districts and at state level. The cost of production and net returns increased as the size of farms increased; seeds, fertilizers and human labour were under-utilized by farmers.

Hence, the production of potato can be enhanced by adopting yield, area and price stabilizing policies through appropriate price support mechanism, launching crop insurance scheme and educating farmers on optimal use of the available resources.

TECHNICAL AND ALLOCATIVE EFFICIENCY OF PADDY PRODUCTION IN TBP AREA-AN ECONOMIC ANALYSIS

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ABSTRACT

The present study investigated the pattern of growth in area, production and productivity, extent of monocropping and economics besides examining technical and allocative efficiency of paddy production in TBP area of Karnataka.

During the entire period of study (1979-80 to 2000-2001), area under paddy in TBP showed an annual growth of 7.44 per cent with fluctuation of 43.93 per cent. Among the districts, area under paddy was found to grow very fast in Raichur district (6.88%) compared to that in Bellary district (4.67%). The annual growth in paddy production in TBP area was about 6.4 per cent. The growth in paddy production has come mainly from the growth in area. The productivity growth rates didn't exceed even one per cent per annum. The per hectare cost of cultivation of paddy was Rs.26,192, Rs.25,938 and Rs.23,822 for farmers in Bellary and Raichur districts and for prize winning farmers respectively. The variable costs constituted the major portion of the total cost of cultivation farming about 85 per cent. The expenditure on human labour was found to be major item of variable cost. The fixed cost per hectare was estimated to be Rs.3,896, Rs.3,746 and Rs.3,772 for the farmers in Bellary and Raichur districts and for prize winning farmers respectively. The rental value of land founded the major item of fixed cost. The gross returns per hectare of paddy cultivation was Rs.42,851 and Rs.40,735 for farmers in Bellary and Raichur districts and for prize winning farmers it was Rs.45,350. The net return over cost C was found to be higher for prize winning farmers which was estimated to be Rs.21,527. Decreasing returns to scale was noticed for the farmers in Bellary and Raichur districts and for large farmers, where $\sum b_i$ value was less than one. The elasticity of production for seeds, labour and fertilizer are positive and significant at one per cent. The elasticity of production for plant protection chemicals was not only negative but also significant in the case of large farmers and for Bellary farmers. The elasticity of production for land was negative for the farmers in Bellary district. However, this negative elasticity was not significant. For the entire TBP area, the use of more quantities of seeds, labour and plant protection chemicals would help in optimizing the resources in paddy cultivation.

The average technical efficiency in general was high for Raichur farmers (0.806). About 28 per cent of farmers in Bellary district and 22 per cent of farmers in Raichur district were found to operate technical efficiency rating of below 0.75. To produce the existing level of output of 76 quintals in TBP area about 25 per cent of less quantities of all the resources would be required if all the farmers were to

operate at the highest technical efficiency level. The average economic efficiency in paddy production for Bellary district and Raichur district was 0.46 and 0.43 respectively. The economic efficiency for the entire TBP area was 0.47.

Developing new vigorous paddy varieties and attendant practices for command areas, rationalizing water rates to regulate water use and monocropping, developing alternative cropping systems to paddy with the use sustainable cropping systems were some of the policy measures suggested by the study.

PRODUCTION AND PRICE BEHAVIOUR OF MAIZE IN KARNATAKA -AN ECONOMIC ANALYSIS

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ABSTRACT

The present study investigated the pattern of growth, instability, economic benefits of maize production and the price behaviour of maize in Karnataka. The study utilized both primary and time series data. The statistical techniques namely, exponential growth function, quadratic and cubic function, decomposition analysis and regression analysis were employed.

The results revealed that during the study period (1980-81 to 1999-00) Kodagu and Shimoga districts registered a significant growth both in area and production; where as, productivity performance of this crop was much encouraging in all the districts except in Uttar Kannada, Bidar and Gulbarga districts. The highest production instability was observed in Shimoga district, mainly because of high variation in area under maize in tile districts. The study revealed that 75 per cent of the total cost of cultivation of maize was constituted by variable cost. The benefit cost ratio in maize production was found to be 1.86. The area, production and productivity of maize were highly correlated with its lagged harvest prices. The lagged harvest prices of maize had positive and significant impact on acreage allocation to maize indicating price responsiveness of the farmers in respect of maize. The area effect and area-price interaction effect was the important contributing factor in increasing the value of maize output in the selected districts. The trends in arrivals of maize exhibited an increasing pattern with mild ups and downs in all the selected markets were as price trend of maize showed a general increasing trend in all the markets but sudden fall in prices of maize was noticed during latter years of study period. The seasonal indices for prices of maize were higher during lean arrival months of July, August and September in all markets.

The policy implication suggested by the study undertaking research and extension activities for improving maize yield, stimulation of maize yield through support price and crop insurance, ensuring timely supply of seeds and fertilizers and farm machinery, provision of storage and storage linked credit to prevent seasonal slump in prices, strict regulation of market charges and ensuring prompt payments of sale proceeds to maize farmers.

ECONOMIC AND ENVIRONMENTAL ISSUES RELATED TO USE OF AGRO-CHEMICALS IN COTTON PRODUCTION IN BELGAUM DISTRICT

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ABSTRACT

The excess use of agro-chemicals in agricultural has not only increased production costs of the farmers but also affected the welfare of society as well as the ecological balance. The use of agro-chemicals appears as an integral part of cotton cultivation. On an average 161.20 kgs of nitrogen (N), 93.10 kgs of phosphorous (P), and 60.02 kgs of potassium (K) were used per hectare, while the plant protection chemicals consumed were 15.73 litres of liquids and 3.98 kgs of dust per hectare.

The yield obtained by the sample farmers was 17.17 quintals leading to the net income of Rs.3088.98 per hectare while the B-C ratio was 1.10, indicating meager profitability of the crop. The low net returns were mainly attributed to set back of monsoon, and higher incidence of insect pests. The regression coefficients for all the inputs were found positive except plant protection chemicals. Timmer measure of technical efficiency indicated that majority of the farmers (50%) were operating in the efficiency range of 50 to 75 percent. The Kopp measure of technical efficiency revealed that majority of the sample farmer's overused agro-chemicals between 15 to 30 percent excess level. The technological externality that of the gross income and FYM applications were the two factors, which influenced the overuse of pesticides significantly. The sample farmers have overused almost all pesticides than the recommended dose of VAS (D). Around 88 percent of farmers experienced health hazards such as conjunctivitis, giddiness, hand burns etc, and only few farmers (12%) have taken the curative measures. Majority of the sample farmers were facing the constraints such as non-availability of resistant varieties, bio-control agents, quality pesticides and so on.

Policy measures indicated were the development of stable and pest resistant cotton hybrids, popularizing non-cash input measures in pest management, popularizing integrated bio-control pest and nutrient management in cotton, extension education in fertilizer management and organic inputs.

MARKETING OF BAMBOO IN KARNATAKA-AN ECONOMIC ANALYSIS

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Bamboo is found well distributed in Karnataka from Uttara Kannada Belgaum districts in the north to Mysore and Chamarajanagar districts in the south. Bamboos have been in demand due to their multifarious uses.

The present study pertains to three eastern plain districts namely, Bellary Bidar and Koppal in Karnataka state. In the first stage two markets in each district and in second stage five traders each from these markets were selected by using multi-stage random sampling. The analytical technique, multiple regression and tabular analysis.

The results revealed that all the three markets viz, Bellary, Bidar and Koppal markets are competitive in nature and co-efficient of inequality was found to be 0.05, 0 and 0.178 respectively.

Traders purchase major quantity of bamboo from private source (96.6%) on monthly basis. The sales pattern followed by KFD was found to be only through allotment and of traders showed that major quantity of bamboo was sold to Medars (70.81%).

Three important marketing channels were found viz. Karnataka Forest Department

Traders Karnataka → Forest Department → Paper mills and producer → sellers → Traders, Consumers. The total marketing cost incurred by traders was found to be Rs.1050 per tonne and that of paper mills was Rs.1305 per tonne of bamboo. The producer's share in consumer's price was found to be 51.88 per cent and the marketing efficiency ratio was 1.07 in channel-III.

All the Traders opined that high transportation cost was a major problem followed by inadequate supply from KFD (83.3%) and harassment from government officials (83.3%). Both the paper mills expressed non availability of bamboo in time as major problem.

Efforts may be made to supply/allot larger quantity of bamboo to medars community and of traders by forest department. Further, bamboo sale by auctioning may be encouraged

STUDY ON SUCCESS OF DEVELOPMENT POLICY IN DHARWAD DISTRICT OF KARNATAKA STATE (INDIA): A CASE OF EMPLOYMENT ASSURANCE SCHEME

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ABSTRACT

The present study aims at examining the success of the Employment Assurance Scheme (EAS). The study covered Dharwad district of Karnataka state and the data was that of the year 2000/2001. Totally 120 beneficiaries, elected representatives and officials were selected from Gram panchayats, Taluk and Zilla Panchayat. Schedule and scales were used to collect data from the respondents. To analyze the data different statistical methods were utilized.

Male, illiterate beneficiaries, landless agricultural laborer, the other forward castes and OBC dominated the scheme. 55 per cent and 23 per cent of the beneficiaries had medium and low attitude respectively. Comparison of means on annual income after EAS and before EAS illustrated significant difference. However, the extent of crossing the poverty line due to their involvement in the scheme is very limited. Comparison of mean scores on knowledge level between elected representatives and officials revealed the existence of significant difference. 56.7 per cent of them had low participation. 66.7 per cent had optimum.

More should be invested in employment and income generation. It would be better to create income-generating assets. A capacity building program for the Gram Panchayats must be organized. SC and ST need special attention. At the Zilla Panchayat and taluk Panchayat level adequate facilities for the officials and experts must be provided and motivation must be created among them. An in built system must be thought for all actors participation at all levels in the process of asset creation. Fund diversion conceivably can be tackled through the Gram Panchayats members ' active' participation in the allocation, budgeting and utilization of funds. Serious and immediate investigation and measures must be taken when some illegal act is reported. The wage paid under the program was below the local wage rate and hence wage rate must be improved.

A STUDY ON EXTENSION ACTIVITIES OF PRIVATE SECTOR IN FARM PRODUCTION AND MARKETING IN KARNATAKA STATE, INDIA

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ABSTRACT

THE study was conducted during the year 2001/2002 in Dharwad. Belgaum and Haveri, districts of Karnataka state. The objectives were to assess activities of private agribusiness firms in farm production and marketing. Twenty private input dealers were selected and data collected by personal interview method.

The important findings of the study were; input supply with specific information and demonstrations were the primary and major activates of private firms. Majority of firms (60%) preferred irrigated areas as their operational target, with in this; they gave priority for areas of high farming population. Small farmers were found to be the frequent beneficiaries of services provided by private input dealers. Contractual farming, product procurement agreement and sharecropping pattern were the methods used by private firms in input supply.

Farmers' willingness for paid extension services as perceived by the private firms was for production technology of horticultural crops, cotton and oilseed crops with first, second and third rank, respectively. Operational jurisdiction of firms, annual turn over, and ownership pattern had significant and positive relationship with extent of extension performance by private firms. A non-parametric test of variable indicted that source of finance, field of study, and source of inspiration had high association with extent of performance. A three-attribute test showed perfect association ($Q=+1$) between extent of performance and field of study in dealing with seed, hence agricultural graduates were found to perform well in this sector. As to ownership pattern, jointly owned firms were performing better than individually owned firms.

Policy restrictions, lack of market for inputs and for farm produces as well, and incompatibility of technologies were the major constraints facing private firms in their business. In defining the role of different stakeholders, respondents indicated that research activity should be undertaken by public sector and input supply could efficiently be attended by private sector.

A PROFILE STUDY OF SWARNJAYANTI GRAM SWAROZGAR YOJANA BENEFICIARIES IN DHARWAD DISTRICT

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ABSTRACT

THE study was conducted during May-June 2002 in Dharwad taluk of Dharwad district. Based on the criterion of maximum number of beneficiaries Dharwad taluk was selected. Among different schemes of SGSY, three agriculture related schemes viz., dairy, minor irrigation and goat rearing were purposively selected. All beneficiaries who got assistance under selected schemes during the year 1999-2001 from all the village in the taluk formed the sample of the study. Final, 35 beneficiaries and 35 non-beneficiaries from 22 villages were contacted. Thus, total sample size of the study was 70.

Gram panchayat personnel, bank officials and ex-beneficiaries were the three major sources through which beneficiaries were aware and got detailed information about the programme.

Sixty percent of the beneficiaries were selected by gram sabha. A large percentage of beneficiaries (45.72%) spent up to Rs. 500 in the form of bride, traveling expenses and fees. Time taken for the sanction of loan was up to four months in case of majority of the beneficiaries (60.01%) and nearly two-third of assets in possession with beneficiaries were intact.

Minor irrigation was the most profitable scheme followed by dairy. Average employment generation was highest in minor irrigation scheme (313 man days).

The major suggestions put forth by beneficiaries were procedure to be made simple (45.71%), quick release of loan (40.00%), bribes at different stages of the programme should be curbed (22.36%).

Majority (80.00%) of the non-beneficiaries opined that SGSY programme is useful, political influence plays role in selection (82.86%).

The socio-economic profile revealed that majority of the beneficiaries was middle aged (60.00%), belonged to forward caste (48.57%), illiterates (68.57%) with nuclear families. The predominant occupation was agricultural labor (42.85%). Majority was (80.00%) lying below the poverty line and majority were not members in any social organization (88.57%).

THE DECISION MAKING PROCESS OF NON-GOVERNMENT ORGANIZATIONS IN DHARWAD DISTRICT, KARNATAKA STATE

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ABSTRACT

The study was conducted during the year 2001-2002 in the purposively selected Dharwad district of Karnataka State. Based on their long years of service, more number of technical staffs, more number of agricultural and rural development programs, and with certain flexibility on these criteria four NGOs were identified for the study. out of the total number of staff members of these NGOs 38 organization members working at different levels formed the number of respondents for the study. The data were collected through questionnaire development for the study. The data thus collected was analyzed using appropriate statistical tools.

The salient findings of the study were: a majority of the respondents were in the 'medium' category with respect to most psychological characteristics viz. job satisfaction, job autonomy, organizational commitment, organizational climate, organizational stress and job stress. Most of the NGO staff had more than ten years of experience.

Field observation and discussion as well as consultation with staff at different level, use of past experience, keeping the objective of the organization, setting benchmarks for monitoring, progress report and reaction from target community were the dominant methods used from problem identification to feedback stage of the decision making process.

In almost all stages of decision-making process field level workers and project officers were found to play a major role followed by project coordinators. However, it was observed that in each stage of decision-making process there was high level of involvement by most staff members working at different levels.

Majority (83.00%) of the staff perceived the decision making as effective wherein most important issues such as staff participation, use of appropriate methods, flexibility, community's role were well taken care of in the process.

Managerial level of the superior, availability of relevant information and financial resource were the most important factors influencing the decision making process.

INFORMATION MANAGEMENT SYSTEM OF DEPARTMENT OF AGRICULTURE FOR FARM PRODUCTION IN KARNATAKA STATE, INDIA

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ABSTRACT

The investigation was conducted during 2001/2002 to study the information Management System of Department of Agriculture for Farm Production in Karnataka State. Dharwad district was purposively selected for the study. During the time of investigation, the Department of Agriculture was positioned with 30 Assistant Agricultural Officers (AAOs) and 68 Agricultural Assistants (AAs). All those 98 extension personnel were selected as respondents of the study. The data were collected by mailed questionnaires developed for the study. Analysis of the collected data was done using different statistical tools.

The important findings of the study were: on overall information indices comparison, AAOs had better knowledge than AAs in information management system by AAOs and AAs were remained statistically same except in a few stages.

Factors like education level, scientific orientation and leadership ability were positively and significantly related with information management system of AAOs. Similarly contact span, scientific orientation and leadership ability were positively and significantly related with information management system of AAs.

Information on some of crop production techniques, weather forecasting, market and farm input were perceived as inadequate by AAOs and AAs for decision making. The study also revealed the main constraints faced by AAOs and AAs in information management system.

The findings of information indices indicated that there is a need to increase the information management system of AAOs and AAs. The positive and significant relationship of the socio-psychological factors with information management system of AAOs and AAs pinpoints to the need for continuous and well planned efforts to strengthen and develop these characteristics among AAOs and AAs. Relevant, accurate and timely farm information for effective decision making is highly required by both AAOs and AAs. This can be achieved through developing better farm information flow strategies.

A STUDY ON GENERAL KNOWLEDGE RURAL YOUTH ABOUT IMPROVED AGRICULTURE, THEIR ATTITUDE AND PARTICIPATION IN FARM ACTIVITIES

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ABSTRACT

Youth are the most potent segment of the population of a country. The youth of today are the hopes of tomorrow. They are the backbone of the country. The socio-economic development and prosperity of rural areas depends, to a considerable extent, on the type of youth living in rural areas, because the rural youth abilities to orient themselves to go along the main stream of the development process.

The present study was conducted in Navalgund taluk of Dharwad district during 2001-02. the selection of taluk was done by randomly (by lottery method) and selection on villages was done by the following purposive sampling method. One hundred and fifty rural youth were selected from the selected villages for the study by proportionate random sampling method.

Majority of the respondents possessed low to medium level of knowledge about improved agriculture. Fifty one per cent of respondents had less favorable attitude, whereas, 33.33 and 15.33 per cent had favorable and more favorable attitude towards agriculture, respectively. majority (60.00%) of the respondents had medium to high level of participation in farm activities.

The socio-economic profile revealed that majority of the respondents had higher level education (70.00%), nuclear family (64.00%), annual income less than Rs. 25,000 (62.00%), land holding up to 10 acres (67.00%), bullock pairs (62.67%), low to medium level of social participation (80.00%), occasional contact with agricultural (66.00%), radio (73.00%) and television sets (65.00%).

Knowledge showed a significant relationship with age, education, extension participation and mass media. Attitude showed a significant relationship with education, annual income, land holding and mass media use. Hundred per cent of the respondents had leisure time and the majority of the respondents spent their leisure time on activities such as resting, talk to elders, reading news papers and listening to radio.

DOCUMENTATION, AWARENESS AND USEGE OF INDIGENOUS KNOWLEDGE ABOUT MEDICINAL PLANTS

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ABSTRACT

The present study on documentation, awareness and usage of indigenous knowledge about medical plants was carried out for six common ailments namely, cold, cough, fever, diarrhea, vomiting and stomach ache the study was conducted in Haveri district of karnataka state. Data for documentation was collected by the focus group discussion method in 14 villages. The documentation remedies revealed the use of a number of plant material like tulsi, ginger, coriander, cassia auriculata, sweet flag, betel leaf for cold; marking nut, bitter gourd, eucalyptus, white onion with omium, turmeric with honey, adhatoda with honey etc. for cough; centratherom with jaggary, adhatoda, clove, coriander and pepper, Indian birthwort with milk bush, heartleaves, neem leaves, centratherum with bael and coriander and lemon grass with milk & sugar etc. to control fever; chakrani beru, pomegranate, banana, roasted Bengal gram, black tea with lemon, liquorice and menthol for diarrhea. Dill seeds and coriander seeds for vomiting, bezoarunt, tanner's cassia, yakki leaves, nutmeg, aloe, baniyan leves etc to control stomach ache. The method of preparation, form of medicine and dosage were also noted. Documented remedies were listed and further data was collected from 210 randomly selected rural women (from seven villages) were not participants in the Focus Group Discussion to know their awareness and pattern of usage. The findings of the present study revealed that most documented remedies find support from reportings of eminent ayurvedic practitioners and plant scientists. The data on awareness and usage shows that awareness was generally higher than the actual usage. The use of remedies where ingredients were available in the kitchen was more when compared to those purchased from the market.

PARTICIPATION OF RURAL WOMEN IN WOOL PRODUCTION

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ABSTRACT

A study on "Participation of Women in Wool Production" was undertaken during 2001-2002 in Haveri district of Karnataka state. Sample consisted of 150 respondents, 30 from five selected villages of Ranebennur taluka. Pre-tested interview schedule was used for collection of information.

The results of the study revealed that 48.33 per cent of the respondents had medium flock size. A high participation was seen in wool production (54.67%) and sheep management (40%). Cent per cent of the respondents had participation in wool processing activity like grading, spinning and warping normally. Time spent in wool production activity was maximum (5 hr 2 min). In case of sheep management wife alone decisions was seen higher in sanitary and yard management (55%). Whereas, 6.67 per cent of the decisions were taken by husband alone in breeding of animals. Regarding wool production cent per cent of the decisions were taken by husband alone in weaving activity. Whereas, 96.67 per cent of the decisions were taken by wife alone in spinning activity.

The returns per rupee of total cost of production of yarn was highest (Rs.1.46) in economic aspect of wool product. The major problems faced by rural women were allergy, cough, stomach ache, joint pain, asthma, eye itching and skin disease.

A STUDY ON DECISION MAKING PATTERN IN FARM AND NON-FARM ACTIVITIES BY THE FARMERS OF SHIMOGA DISTRICT IN KARNATAKA STATE

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ABSTRACT

The study was conducted in Shikharipur taluk, of Shimoga district Karnataka to assess the decision making pattern in farm and non-farm activities by the farmers. Expost-facto research design was employed to elicit the data from 150 farmers selected through proportionate random sampling method.

The major findings were: Majority of the farmers consulted found to be taking self decision rather than consultative decision or decision by other members of the family in most of the farm and non-farm decision making activities.

Self-decision was found to be comparatively higher in case of marketing of crop produce (54.67%) in farm decision making activities and purchasing activity (62.00%) in non-farm decision making activities. Consultative decision was found to be comparatively higher in case of plant protection chemicals and their use (49.33%) and marriage related issues (54.67%) with regard to farm and non-farm decision-making activities, respectively.

Wife was found to be consulted least in decision making with regard to both farm and non-farm activities when compared to other members of the family.

Majority (80.67%) of the respondents were found to be playing major role in decision making regarding non-farm activities in case of financial management and regarding farm decision making activities in case of choice of crop and varieties (85.33%).

Decision making pattern in farm activities has shown a significant relationship with age and family type than other socio-economic and personal characteristics of respondents considered for the study. While, in case of non-farm activities, it has shown a non-significant relationship with age, family type and family size.

Labor availability and cost (54.00%), comparative advantage (41.33%) and crop requirement (36.00%) were the major factors considered by the respondents, while economic status of the family (55.33%) was the major factor considered by the respondents in decision making regarding farm and non-farm activities, respectively.

**STATISTICAL EVALUATION OF PRICE VARIATION IN TROPICAL TIMERS
[TEAK (*TECTONA GRANDIS* LINN.), ROSE WOOD (*DALBERGIA LATIFOLIA*
ROXB.) AND YELLOW TEAK (*ADINA CORDIFOLIA* ROXD.)]**

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ABSTRACT

Timber is now becoming a scarce commodity. The demand for industrial wood as estimated by National Commission on Agriculture is 27 million cubic meter. Among the timber species, three important species are teak, Rosewood and Yellow teak. These three species are selected for the study of the price variation. There are many regulated government timber depots, which take up sale of timber. Among them the Dandeli timber depot is important, as sale is regularly conducted and is well known recognized by the forest industries and it is located in the reputed place for teak, Rosewood, and Yellow teak. The information on periodic sales conducted twice a year was collected for teak and Yellowteak from the depot office. The data pertains to the period May 1987 to May 2001. The information on periodic sales conducted once a year for Rosewood was collected from the depot office. The data pertains was gathered lot wise, sold in the auction.

A multiplicative model of time series was employed to know the trend of different timber species. For teak, in all classes the trend was steadily increasing starting from 1987 till the end. However, all classes in case of Rosewood a particular pattern was observed that for first 9 years starting from 1987 there was steadily increase, later there was steep increase in trend. For yellow teak, in all classes the trend was steadily increasing. Starting from 1987 till end.

Exponential smoothing model was preferred for forecasting purpose. The single parameter exponential smoothing model was used to predict the prices of teak, Rosewood and Yellow teak. However, the ex-post forecast values are closer to the actual values than ante-forecast.

Hedonic price analysis was done separately for teak, Rosewood and Yellow teak to know the contribution of different factors to the price. In case all three timbers, volume of the wood was found to be highly significant in all the models (log, semi – log and linear) number of logs was found to be non significant in case of teak and Rosewood except Yellow teak. For teak and Yellow teak Girth was found to be significant. Length is another factor that contributes the price of the timber in all the timber species.

Analysis of variance was done separately for teak, Rosewood and Yellow teak to know the variation among the classes of timber. In case of teak Clb recorded the highest value. The similar trend was also followed with DIVb. Similarly ClIc recorded

lowest value. In case of Rosewood DIVb recorded highest value. The similar trend was also followed with DIc. Clb class recorded lowest value. In case of Yellow teak DIVb recorded highest value. The similar trend was also followed with CIIc. DIc class recorded lowest value.

BEHAVIOR OF PRICE AND ARRIVALS OF MAIZE IN BELGAUM DISTRICT – A STATISTICAL INVESTIGATION

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ABSTRACT

MAIZE is one of the important food grains in the world. Apart from its use as a food grain for human consumption, it is being used for manufacturing industrial products. The information on price and arrivals of maize has been collected from Gokak, Ramdurga and Saundatti regulated markets. The secondary data pertaining to monthly, model price Rs. per quintal and monthly total arrivals in respective markets for evaluating different objectives. It was noticed in all the markets arrivals were an increasing trend. Whereas, price is increasing in Saundatti market, but slightly decreasing trend is noticed in Gokak and Ramdurga markets.

The arrivals of maize were presence of seasonality effects within the year and constancy of such effects from year to year. The reason starts from August to September and it is peak from December to February in both Gokak and Ramdurga markets. However, November to January in Saundatti market, in case of price, there is a presence of seasonality effects among months but the effects were of the same pattern over all years, higher price was in June to August in Gokak and Ramdurga markets but August to October in Saundatti market.

In all correlation was significant between farm harvest price and regulated market price. Among three markets in Gokak market high correlation was found. Positive and significant correlation between farm harvest price necessarily increase the farm harvest price.

For studying the market integration, the correlation coefficients calculated between any two markets for the unadjusted price as well as adjusted price of maize crop. It indicated that the coefficients are generally high in unadjusted price series than an unadjusted price series. Among the three markets, Gokak and Ramdurga markets are generally well integrated.

EVALUATION OF STATISTICAL MODEL FOR NUTRITIONAL STATUS

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ABSTRACT

The term 'adlescence' comes from Latin word adolescere, meaning "to grow" or "to grow to maturity". It comprises of the period from 13-18 years for girls and 14-18 years for boys. They contribute to the human potential and impart strength to the nation economy and development; hence the nutritional status is of great significance. Nutritional status of adolescent girls of residential and non-residential schools was assed by nutritional anthropometry and diet survey. The anthropometric measurements were compared with Indian and international standards to know the nutritional status by using Z-test. Good nutritional status of the subjects can be seen only if good nutritious food reaches to every section of the people i.e., the benefits should be distributed evenly in the entire population. The intra and inter variations in calorie intake among different age group and schools should be minimum. The distribution of calorie intake per consumption unit is more important than the mean level comparisons. Therefore appropriate distributions for the data of Calorie intake per consumption unit for both the population were tried, the log normal and normal distributions were found appropriate.

**REPRODUCTIVE BIOLOGY OF NOTHAPODYTES NIMMONIANA (GRAH.)
MABBER: AN IMPORTANT ANTI- CANCER DRUG YIELDING MEDICINAL TREE**

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ABSTRACT

Nothapodytes nimmoniana, a lower canopy tree of moist-deciduous forests, is an important source of camptothecin- a potent drug to cure mammalian cancer. Camptothecin is the third most important alkaloid sought-after by the Pharmaceutical companies around the world. The present study was carried out at the College of Forestry, Sirsi, to understand the reproductive biology and to standardize protocols of vegetative propagation of *N. nimmoniana*, which are prerequisite for genetic improvement and domestication of the species.

Perhaps for the first time, seven sexual systems Viz., androecious, gynoeceous, hermaphrodite, monoecious, andromonoecious, gynomonoecious, and trimonoecious types were identified at the individual level in this species. Larger trees more often tended to be functionally females, while smaller were males. Generally male flowers were larger, produced ample pollen grains and attracted more floral visitors than female flowers. It is a typical fly-pollinated, bird-dispersed deciduous species. Assisted pollination experiment showed that fruit set in this species is limited by pollination in its natural habitats. Identification of floral variation exhibited in *N. nimmoniana* helps in planning specific crossing program's involving appropriate sexes.

N. nimmoniana seeds belong to sub-orthodox group of seeds with a maximum germination up to 90 days after maturity, and subsequently reduces to zero after 165 days. Pre-sowing seed treatments did not significantly influence the germination percentage, although speed of germination was improved with the removal of seed-coat and treating with GA₃ at 50ppm concentration. Treating pencil-thick stem cuttings collected during leaf-less period with coumarin at 2000ppm in dust-form induced maximum percent rooting and sprouting. As an initial step in domestication, *N. nimmoniana* can be adopted as a perennial component of agro forestry systems for multistory and/or for bund planting since it is non-browsable, shade-tolerant and a good coppicer. Since the wood chips are in great demand, growing this species on marginal lands can benefit farmers.

ASSESSMENT OF ECOLOGICAL AMPLITUDE OF *ARTOCARPUS HIRSUTUS* LAM.: A THREATENED MULTIPURPOSE TREE

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ABSTRACT

Artocarpus hirsutus, an endemic tree of the Western Ghats prized highly for its timber, medicinal value and for its agro forestry uses has recently been assigned a threat status of 'Vulnerable – globally'. The present study was carried out at the college of forestry, sirsi to assess its ecological amplitude, population structure and regeneration status in three different forest types spanning six clusters of Uttara Kannada District.

Disturbed evergreen forests of Uttara Kannada were floristically more rich compared to undisturbed evergreen forests in terms of stand and regeneration density, species richness as well as diversity complying to 'mild disturbance' theory. Diversity indices for regeneration and general stand showed much less variation between different forest types suggesting a resurgence of the ever greenness.

A. hirsutus was a prominent floristic component among undisturbed evergreen forests of Uttara Kannada as shown by higher relative frequency and IVI value (3.22 and 8.84, respectively) than among disturbed evergreen (2.27 and 7.17, respectively). While *A. hirsutus* was virtually absent from localities with higher dryness, it appears that medium level of moisture regime would be favourable for this species. *Holigarna grahmi* and *vitex altissima* were common-most associates of *A. hirsutus* with respect to their ecological amplitude in the study area. The population structure of *A. hirsutus* in different forest types showed increasing distorted trend with disturbance. The effect of disturbance was more apparent on the regeneration of *A. hirsutus* suggesting a greater vulnerability of the future population. The species was also suffering from inbreeding depression as shown by higher proportion of albinism among progeny of several populations. Ten plus trees from three populations were selected adopting subjective evaluation method, which may form a basis for its further genetic improvement.

DOCUMENTATION AND CHARACTERIZATION OF FOREST NURSERY DISEASES IN UTTARA KANNADA.

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ABSTRACT

Seedling diseases in forest nurseries are the main constraint in producing quality seedlings. The present study was carried out at the college of Forestry, Sirsi to document forest nursery disease of Uttara Kannada, to characterize associated pathogens and to evolve *in vitro* management strategies.

Disease survey in 15 nurseries 39 diseases of major and minor importance. The disease were recorded and ranked based on percent disease index (PDI). Leaf and tip blight of *Lanceolata* caused by *Pestalotiopsis mangiferae*, leaf and tip blight of *Lagerstroemia lanceolata* caused by *Pestalotiopsis mangiferae*, leaf spot of *Sapindus emarginatus* caused by *Phoma prunicola* and leaf spot of *Pongamia pinnata* caused by *Phyllosticta* sp. Stood first (60.65%), second (55.65%) respectively. The other characterized pathogens were *Alternaria alternata*, *Pseudocercospora adinicola*, *Nigrospora* state of *Khuskia oryzae*, *Phyllosticta artocarp*, *Pestalotiopsis versicolor* and *Rhizoctonia solani*

For detailed study, *P. prunicola* causing leaf spot of *S. emarginatus* and *R. solani* causing seedling of blight of *B. arundinacea* were considered. In growth studies, potato dextrose agar (PDA) supported maximum mycelial growth and sporulation of *R. solani*, whereas in case of *P. prunicola*, PDA, Czapek Dox agar and host leaf extract agar were the best. Eleven fungi were recorded as seed borne mycoflora of *L. lanceolata*, *S. emarginatus* and *B. arundinacea*. In *in vitro* efficacy studies, Carbendazim was the most effective against *R. solani* and *P. prunicola* among 6 fungicides tested and among plant extracts, fruit extract of *Terminalia chebula* significantly inhibited both the pathogens. From the soils of nurseries 20 isolates of *Trichoderma* spp. were isolated with four species viz., *T. harzianum*, *T. viride*, *T. koninigi* and *T. hamatum*. *In vitro* bioassay studies using 20 isolates against *R. solani* indicated that, the isolates of *T. harzianum* were best in inhibiting its growth.

EVALUATION OF CHINA ASTER [*CALLISTEPHUS CHINENSIS* (L.) NEES] GENOTYPES UNDER TRANSITIONAL ZONE OF NORTH KARNATAKA

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ABSTRACT

China aster is a half hardy annual commercial and ornamental flower crop grown for its flowers. The flowers of aster are used for flower arrangement, interior decoration, garland making, worshipping. It can be grown in herbaceous borders, in flower beds, in garden decoration and also as potted plants.

The present investigation was carried out in the floriculture unit of Department of Horticulture, University of Agricultural Sciences, Dharwad during 2001-2002. The main objectives of investigations were to study the Evaluation of China Aster (*Callistephus chinensis* (L.) Nees) genotypes under Transitional zone of North Karnataka. The genotypes 'Phule Ganesh White' produced bigger sized flowers (8.48 cm) having maximum flower weight (9.89 g) and hence recorded the highest flower yield among all the genotypes. The genotypes 'violet cushion' and 'Shashank' produced more number of double flowers but their yield was comparatively lesser compared to 'Phule Ganesh Series'. However, stalk length, flower diameter and vase were comparatively superior. Hence, these genotypes performed better in terms of quality and suitable for cut flower production.

The genotypes 'Phule Ganesh White' and 'Kamini' produced higher seed yield per plant and per hectare as compared to other genotypes. The gross and net returns were highest 'Phule Ganesh White' followed by 'Giant Branching Comet' and 'Rainbow mix'. Among different genotypes 'Phule Ganesh Pink', 'Phule Ganesh violet' and 'Phule Ganesh White' had significantly higher vase life. Phenotypic and Genotypic coefficient of variation were medium characters like, number of flowers per plant, stalk length and vase life. High heritability with medium genetic advance was observed for number of leaves per plant and number of flowers per plant.

Thus, the promising genotypes for transitional zone are 'Violet cushion', 'Shashank', 'Kamini' and 'Poornima' for cut flower production. Whereas, all the 'Phule Ganesh Series' are suitable for garland making.

INFLUENCE OF PLANTING TIME, PLANT DENSITY AND NUTRITION ON SEED YIELD IN FENUGREEK (*Trigonella foenum-graecum* L.)

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ABSTRACT

A field investigation was carried out during 2001-02 at University of Agricultural Sciences, Dharwad to study the influence of planting time, plant density and nutrition on seed yield in fenugreek. The investigation constituted of two experiments, the first experiment was laid out in two factorial RCBD with different levels of fertilizers, vermicompost, FYM at varied spacing and their combinations. Another experiment was laid out in RBD with different dates of sowing.

The studies on different levels of fertilizers, vermicompost and FYM at varied spacings indicated that the plant sown at 30 cm x 5 cm spacing supplied with 50 per cent recommended dose fertilizer @ 50:25:0 NPK kg/ha +50% vermicompost @ 1.0 t/ha recorded the highest seed yield of 26.96 q/ha. Though the seed yield per plant (13.60 g) was higher at 30 cm x 15 cm spacing from the plants receiving 50% RDF +50 % vermicompost, it was not able to compensate low yield (24.19 q/ha) on hectare basis owing to less plant population. The findings of the present investigation revealed that the fenugreek plants grown at closer spacing (30 cm x 5 cm) with recommended dosage of fertilizers recorded the maximum total uptake of nitrogen and phosphorus (73.47 and 20.40 kg/ha) whereas, total potassium (35.53 kg/ha) was maximum in plots receiving only vermicompost at 30 cm x 5 cm spacing. The net income (50,300/ha) and cost benefit ratio (1:3:9) was also maximum in treatment combination of 50% RDF +50% vermicompost sown at closer spacing (30 cm x 5 cm).

The results of another experiment on effect of planting time on seed yield in fenugreek indicated that the crop sown on 5th October resulted in production of maximum seed yield (23.07 q/ha) followed by the crop sown on 5th July (14.43 q/ha).

It is observed from the studies that vermicompost had better substitution potential and it would replace 50 per cent RDF advantageously and sole application of either organics or inorganics has limited advantage.

PRODUCTION POTENTIAL OF TOMATO IN LEUCAENA BASED ALLEY CROPPING SYSTEM WITH DIFFERENT SOURCES OF NUTRIENTS

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ABSTRACT

An experiment was undertaken to assess the production potential of tomato in leucaena based alley cropping system with different sources of nutrients under irrigated condition. Treatment consisting of cropping systems as a main plot treatments and different sources of nutrients as a sub plot treatments were imposed in split plot design with three replication to assess the performance of tomato in red sandy loam soils during *rabi* 2001-2002 at horticulture garden of Regional Research Station, Raichur.

Significant difference was observed with respect to growth, development and productivity of tomato due to cropping systems, different source of nutrients and their interaction effect. Among the main plot treatments alley tomato supplied with leucaena lopping proved to be most potential as it resulted in significantly the higher yield (27.79 t/ha). The enhanced yield of tomato due to aforesaid treatment was attributed to better growth and yield parameters. On the contrary sole tomato deprived of lopping resulted in significantly the lowest yield (23.42 t/ha). This signifies the incorporation of leucaena loppings.

The performance of tomato with respect to different sources of nutrients was also significant. Tomato supplied with FYM @ 25 t/ha + 25% RDF proved to be better as exhibited by significantly the highest fruit yield (28.26 t/ha), when compared to other treatments. Significantly the lowest (23.73 t/ha) fruit yield was noticed due to the influence of VAM + 25% RDF.

The interaction effect of cropping system and different sources of nutrients too proved to be significant. The response of alley tomato nourished with leucaena loppings and supplied with FYM @ 25 t/ha + 25% RDF proved to be superior as indicated by significantly the highest fruit yield (30.99 t/ha). On the other hand sole tomato deprived of loppings with VAM + 25% RDF appeared to be poor as reflected by significantly the lowest fruit yield (21.27 t/ha).

PERFORMANCE OF STANDARD CARNATION (*DIANTHUS CARYOPHYLLUS* L.) CULTIVARS UNDER PROTECTED CULTIVATION FOR SECOND FLUSH

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ABSTRACT

At attempt has been made on "Performance of Standard Carnation (*Dianthus caryophyllus* L.) Cultivars Under Protected Cultivation for Second Flush" for the period from February to August 2001 in the polyhouse of progressive farmers in Belgaum. The experiment was laid in completely randomized block design with three replication and nine cultivars as treatments.

The carnation cultivars have showed significant variations for growth yield quality and incidence of pest and disease.

Cultivars Madame Collette West pretty, Desio and Aicardi were superior with respect to growth parameters like plant height, stem girth, number of branches, number of leaves, leaf area and chlorophyll content.

Cultivars Desio, Sorisso, Madame Collette, and Alma were early for flower bud initiation and flower opening whereas, Pirandello and Aicardi were late for these parameters.

For quality parameters in terms of stalk length, stem girth, bud and flower diameter, number of petals per flower, weight of flower vase life and fragrance, cultivars like Madame Collette West Pretty, Desio, Aicardi and Alma were found superior. Calyx splitting was minimum in cultivars West Pretty, Desio, Sugar Baby, and Madame Collette (<1%) and was maximum in Cv. Pirandello.

Cultivars Madame Collette West Pretty, Desio and Aicardi were identified as good yielder in terms of number of flowers per plant.

Incidence of *Fusarium* wilt was minimum in cultivars Madame Collette Pirandello, Alma and Aicardi whereas Cv. Sorisso recorded maximum incidence disease. Mite infestation on bud and leaves was minimum in cultivars Madame Collete, Sugar Baby, Alma and West pretty whereas it was maximum in Cv. Sorisso.

The cultivars Madame Collette, West Pretty, Alma and Aicardi were promising for protected cultivation based on their yield and quality attributes and pest and disease incidence.

EFFECT OF CHEMICAL TREATMENTS AND PACKAGES ON PHYSIO-CHEMICAL CHANGES AND SHELF-LIFE OF MANGO

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ABSTRACT

The present investigation consisting of two experiments was carried out in the Division of Horticulture Regional Research Station, Raichur during 2001-02.

In the first experiment among seven pre-harvests treatments fruits treated with NAA 200ppm was found to be significantly superior over other treatments. This treatment was most effective in reducing the physiological loss in weight (PLW) delay loss percent. Further it helped in maintaining high total soluble solids (TSS) acidity, ascorbic acid and chlorophyll content. Consequently it recorded higher organoleptic rating and helped in extending the shelf-life up to 18 days. The next best treatment was GA₃ 50ppm (16.50 days) as against control (10 days).

Second experiment comprising of nine treatments with different cushioning material and ethylene absorbent paper shreds impregnated with KmnO₄ (2%) was found to be significantly effective in reducing PLW maintaining higher TSS acidity ascorbic acid, chlorophyll and organoleptic rating lesser decay loss and extended the shelf-life up to 21.50 days. The next best treatment was fruit packed with straw impregnated with KmnO₄ two percent (20 days).

**GENETIC VARIABILITY, HERITABILITY AND PATH COEFFICIENT STUDIES IN
POTATO
(*SOLANUM TUBEROSUM* L.)**

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ABSTRACT

A study involving one hundred potato genotypes was conducted at Department of Horticulture, MRS, University of Agricultural Sciences, Dharwad, during *kharif*-2001 to estimate the nature and magnitude of Variability, character association and to identify suitable genotypes for Northern Karnataka. Analysis of variance revealed significant differences for all the characters indicating the presence of sufficient genetic variation among the test genotypes.

Majority of the traits exhibited high PCV and GCV indicating wide range of variation in the genotypes in respect of the characters studied. High heritability combined with high genetic advance over the mean was registered for most of the characters indicating the influence of additive type of gene action in the traits. Hence, the genotypes could be further improved through simple selection methods.

Highly significant and positive correlations were noticed between tuber yield with plant height, plant spread, number of main stems per plant, weight and number of medium and large size tubers both at phenotypic and genotypic level indicating true relationship between yield and the traits. Path co-efficient analysis revealed that weight of medium and large size tubers was found to be the most yield predicting factor.

The genotypes formed eight clusters based on D^2 values with higher number of genotypes in cluster I. Clustering pattern indicated that geographic distribution of the genotypes had no correlation with genetic diversity. Cluster II and VI with genotypes CP-1880 and CP-1740 respectively were the most distant clusters. Average weight of tubers was the highest contributor to total divergence. CP-1740, CP-1859 and CP-1670 were found to be best genotypes with high yielding potential which could be used in future breeding programme.

EFFECT OF PLANT DENSITY AND GROWTH REGULATORS ON GROWTH, BIOMASS AND OIL YIELD OF DAVANA (*ARTEMISIA PALLENS* WALL)

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ABSTRACT

A field study was made with davana (*Artemisia pallens* Walt) on sandy loam soil at Horticulture Garden, Regional Research Station, Raichur during 2001-2002. The experiment consists of 30 treatment combinations with three plant densities viz. 15 × 5cm (13,33,333 plants ha⁻¹), 15 × 7.5cm (8,88,888 plants ha⁻¹) and 15 × 10cm (6,66,666 plants ha⁻¹) and nine levels of growth regulators viz., TIBA (400, 600, 800ppm), GA₃ (100, 200, 300ppm). Kinetin (2, 4, 6ppm) and control refers to distilled water spray. The growth regulator sprays were taken at 30 and 60days after transplanting (DAT). The experiment was laid out in split plot design. The crop was harvested twice, first when it attained 75days (main crop) and second at 60 days after first harvest (ratoon crop).

Plant height was maximum when the plants were spaced at plant density of 15 × 7.5cm. But, maximum number of branches, plant spread, number flower heads, weight of 1000- flower heads, fresh weight of flower heads, fresh and dry weight of herb per plant and oil content increased with increase in spacing from 15 × 5 to 15 × 10cm in both the harvests. However, days taken to 50 percent flowering was significantly least at closer spacing of 15 × 5cm. Significantly higher biomass and oil yield was recorded at 15 × 7.5cm in both the harvests compared to rest of the plant densities.

Significantly higher number of branches and plant spread was recorded due to foliar application of GA₃ 300ppm. Days taken to 50 per cent flowering was least due to foliar spray of kinetin 6ppm. Weight of 1000-flower heads and essential oil content was significantly highest in control. Number of flower heads, fresh weight of flower heads, fresh and dry weight of herb, biomass and oil yield was maximum, when crop was sprayed with GA₃ 300ppm followed by GA₃ 200ppm in main crop. However, growth regulators did not had any effect on ratoon crop.

Highest plant height biomass yields and oil yield was recorded at 15 × 7.5cm and sprayed with GA₃ 300ppm in main crop. The same treatment also recorded highest gross returns (Rs.2,51,370/- ha⁻¹) and net returns (Rs.2,10,920 ha⁻¹) with B:C ratio of 1 :5.2.

PROCESSING OF AONLA (*EMBLICA OFFICINALIS* GAERTH) FRUITS

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ABSTRACT

THE studies on extraction and storage of aonla juice standardization of recipe for aonla juice based beverages and preparation of dehydrated aonla slices were conducted at Kittur Rani Channamma College of Horticulture Arabhavi, during 2001-2002.

The aonla pulp treated with pectinase-A at 2g/kg for 12 hours had maximum juice recovery (88.35%) with better quality parameters (TSS 10.38%, acidity 1.98%, pH 3.85%, ascorbic acid- 293.96 mg/100g, reducing sugar 1.48%, non-reducing sugar 8.26%, total sugar 10.17% sugar acid ratio 5.44). The organoleptic scores (out of 5.0) for juice were 3.23 for colour and appearance, 2.73 for taste, 2.62 for flavour and 2.81 for overall acceptability.

The RTS having a recipe of 12% aonla juice + 2% lime juice + 1% ginger + sugar adjusted to a TSS of 15⁰ B was found to be acceptable with organoleptic scores (out of 5.0) of 3.69 for colour and appearance 3.47 for taste, 3.35 for flavour and overall acceptability. The squash having a recipe of 30% aonla juice + 5% lime juice + 2% ginger + sugar adjusted to a TSS of 40⁰ B was found to be acceptable with organoleptic scores (out of 5.0) of 3.73 for colour and appearance 3.67 for taste 3.69 for flavour and overall acceptability. The syrup having a recipe of 45% aonla juice + 10% lime juice + 4% ginger + sugar adjusted to a TSS of 68⁰ B was found to be acceptable with organoleptic scores (out of 5.0) of 3.81 for colour and appearance 3.50 for taste, 3.24 for flavour and 3.38 for overall acceptability.

For obtaining the organoleptically acceptable good quality dehydrated aonla fruit slices blanching the whole fruit followed by steeping the slices in 50⁰B syrup containing 0.2% KMS for 24 hours and drying directly under sun was found to be best. The organoleptic scores (out of 5.0) were 3.88 for colour and appearance 3.38 for texture, 3.38 for flavour 4.00 for taste and 3.78 for over all acceptability. The recovery of dehydrated slices was 35.10% with a dehydration ratio of 2.87. Time taken for drying under sun was 22 hours, whereas it was 17 hours in solar drier and 15 hours in electric drier.

STUDIES ON PROCESSING OF SAPOTA (MANILKARA ACHRAS (MILL.) FOSBERG) FRUITS

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ABSTRACT

THE investigation entitled “ Studies on processing of sapota (Manilkara achras (Mill.) Fosberg) fruits” was carried out at the Kittur Rani Channamma College of Horticulture, Arbhavi University of Agricultural Sciences Dharwad during the year 2001-2002 with an objective to standardize juice extraction techniques and preparation of dehydrated slices.

The highest recovery of sapota juice (73.15 percent) was obtained by treating the pulp with 0.0075 per cent Pectinase-B enzyme for four hours with better quality parameters viz., TSS 20.21 percent total titrable acidity 0.258 percent reducing sugar 8.43 percent, non-reducing sugar 6.74 percent total sugar 15.39 percent and non-enzymatic browning (OD value) 0.219. The organoleptic scores (out of 5.00) for juice were 3.55 for colour and appearance 3.38 for taste, 3.55 for flavour and 3.51 for overall acceptability.

**STUDIES ON VARIABILITY CHARACTER ASSOCIATION AND PATH ANALYSIS
FOR YIELD AND YIELD ATTRIBUTES IN KAGZILLIME (*Citrus aurantifolia*
Swmgle.)**

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ABSTRACT

A survey was carried out to evaluate promising kagzilime strains in Bijapur district covering 180 plant in two talukas viz., Indi and Sindagi.

Of these 180 strains strain Klb-75 had recorded maximum plant height (4.10m) while strain KLB-44 registered maximum east-west spread (4.10m) and plant canopy (60.84 m³).

The strain KLKW-114 recorded maximum number of fruits (2350) while strain KLA-28 recorded highest fruit yield (110.96 kg/plant).

The fruit shape was varied from oval to spherical round. The strain KLS-169 had maximum fruit weight (75.00g) fruit size (25.88 cm) fruit volume (73.33 ml) juice percent (36.67%). The strain KLKW-102 recorded highest fruit length (5.50 cm) and fruit shape index (1.25). The strains KLKW-104 and KLA-24 had recorded maximum number of seeds per fruit (19.00) and number of segments (12.64), respectively.

The strains KLA-17, KLA-27, KLB-52 KLB-144 and KLK-146 had recorded maximum peel thickness (0.30 cm). Among the qualitative characters strains KLA-2 KLN-18 KLK-126 and KLK-148 had recorded maximum TSS (10.30⁰ Brix) acidity (9.60%) TSS: acid ratio (1.36) and ascorbic acid content (39.70 mg/ 100ml) respectively. There were greater variation with respect to leaf miner incidence and polembryony.

Fruit yield had positive and significant association with plant height east-west spread north-south spread plant canopy trunk diameter leaf area and number of primary branches and had negative association with leaf miner incidence wherein equator diameter polar diameter fruit size fruit volume number of seeds per fruit juice content and fruit yield per plant and juice volume showed positive significant association with fruit weight.

Number of primary branches fruit volume polar diameter north-south spread and fruit weight had shown positive direct effect on fruit yield per plant.

Among the survived strains KLA-28 KLA-18 KLK-130 KLK-146 KLKW-102 KLKW-114 and KLK-124 were found highly productive with respect to fruit yield.

EFFECT OF *Glomus fasciculatum* AND MICROBIAL CONSORTIA ON GROWTH AND YIELD OF BANANA cv. RAJPURI (*Musa AAB*)

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ABSTRACT

AN investigation was carried out on banana cv. Rajapri (*Musa AAB*) to study the effect of *Glomus fasciculatum* and microbial consortia on growth and yield in the department of Pomology, Kittur Rani Channamma College of Horticulture, Arbhavi during 2001-2002.

The inoculation of *Glomus fasciculatum* resulted in significantly higher values for the characters viz., plant height pseudo stem girth, leaf area, bunch weight and bunch length bunch width number of hands per bunch number of fingers on 3rd hand, total number of fingers per bunch finger length finger girth finger weight pulp weight pulp to peel ratio total soluble solids TSS : acid ratio reducing sugar total sugar yield per hectare leaf P and K content spore count and percent root colonization while significantly lower values were recorded in non-VAM plants. The values for crop duration acidity and nematode population were significantly lower in VAM plants.

Application of microbial consortia-II (M-II) was equally effective as 100 percent recommended dose of fertilizers (RDF) in increasing vegetative growth parameters viz., plant height plant girth number of leaves leaf area and number of suckers. M-II and 75 percent RDF + microbial consortia-I (M-I) were par with 100 percent RDF in including early shooting. 75 percent RDF + M-I recorded higher yield and yield attributes. Mycorrhizal parameters viz., root colonization and extrametrical spore count were found to be significantly higher in plants applied with M-II.

Microbial consortia-II and 75 percent RDF + M-I lower nematode population.

Interaction effects between main treatments (VAM) and sub-treatment (consortia) were non-significant.

INFLUENCE OF VAM VERMICULTURE AND *Trichoderma harzianum* ON GROWTH AND YIELD OF BANANA CV. RAJAPURI (*Musa* AAB)

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ABSTRACT

An investigation was carried out on banana cv, Rajapuri to study the influence of VAM vermiculture and *Trichoderma harzianum* on growth and yield during 2000-2001 at the Department of Pomology Kittur Rani Channamma College of Horticulture, Arabhavi, University of Agricultural Sciences, Dharwad.

The inoculation of VAM fungus (*Glomus fasciculatum*) recorded significantly higher values for the characters viz., vegetative parameters (plant height, number of leaves, number of suckers), bunch characters (bunch weight, number of hands per bunch, total number of finger per bunch), finger characters (finger weight, finger length, pulp weight), quality parameters (reducing sugar, total sugar), yield, percent root colonization and spore count while lower values were recorded for total crop duration and nematode population.

The plants cultivated with in-situ vermiculture produced significantly higher vegetative characters (viz., plant height, plant girth, leaf area) and quality parameters (reducing sugar, non-reducing sugar, total sugar). The plants grown with 75 percent RDF + vermicompost produced higher bunch weight, total number of fingers per bunch, finger weight and yield characters.

Plants cultivated with VAM fungus and in-situ vermiculture produced higher plant height, higher reducing sugar, higher percent root colonization and spore count. Inoculation of VAM fungi applied with 75 percent RDF + vermicompost produced significantly higher bunch weight, more number of fingers per bunch, higher yield characters and lesser nematodes.

STUDIES ON HETEROSIS AND COMBINING ABILITY IN SWEET X HOT PEPPER CROSSES

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ABSTRACT

THE investigation on heterosis and combining ability in sweet x hot pepper crosses were carried out at K.R.C College of Horticulture, Arabhavi. The 27 crosses derived by crossing 9 chilli lines with 3 capsicum testers were evaluated along with parents in RBD with three replications and data was subjected to line x tester analysis.

The magnitude of heterosis over the standard parent (entry 8: LCA 301) was very high in desirable direction for fresh weight of red fruits per plant (188.69%) chlorophyll 'b' (180.48%) early green fruit yield per plant (167.89%) dry fruit weight per plant (90.35%) total green fruit yield per plant (74.48%) average fruit weight per plant (71.58%) fruit diameters (58.33%) fruit length (40.62%) and numbers of fruit per plant.

The crosses showing highest and significant heterosis over the standard parent for total green fruit yield per plant were 11x7 (74.48%) 10x39 (64.04%) and 10 x2 (56.10%). The crosses, viz., 10 x 39 (90.35%) 9 x 39 (75.65%) and 9 x 3 (73.40%) exhibited maximum heterosis for dry fruit weight per plant.

In a comprehensive assessment involving sca effects for 20 characters 14 crosses (9 x 39, 11 x3, 10x 5 etc.) were identified as high performances and regarded as good specific combiners. Among chilli lines, entry 8,2 and 5 and among capsicum lines, entry 9 were identified as overall good general combiners based on the comprehensive study considering gca effects for 20 selected traits. Non-additive gene action was predominant for stem girth, specific leaf weight, fresh and dry fruit weight per plant, fruit diameter, percent fruit set, number of seeds per fruit and plant spread. It is suggested to improve these characters through recurrent selection schemes, which ultimately helpful for increasing yield through heterosis breeding.

HETEROSIS AND COMBINING ABILITY IN ROUND FRUITED BRINJAL (*SOLANUM MELONGENA* L.)

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ABSTRACT

The investigation on heterosis and combining ability in round fruited brinjal (*Solanum melongena* L.) were carried out at K.R.C. College of Horticulture, Arabhavi. Eight parents were crossed in all possible combinations excluding reciprocals to develop 28 F_{1s} using half diallel mating design. These 28 F_{1s} , eight parents and a commercial check hybrid (Kalpataru) were evaluated in RBD with three replication.

For early fruit yield, the crosses, $G_2 \times G_8$ (91.12%), $G_4 \times G_5$ (64.49%) and $G_3 \times G_7$ (58.25%) were found most heterotic over commercial check hybrid. For total yield, $G_1 \times G_2$, $G_2 \times G_3$ and $G_2 \times G_8$ exhibited more than 40 per cent heterobeltiosis with only one hybrid ($G_2 \times G_8$) exhibiting significant and positive field heterosis over commercial check hybrid. The other promising hybrids with more than 20 per cent field heterosis were $G_1 \times G_2$, $G_3 \times G_7$, $G_4 \times G_5$, $G_3 \times G_5$, $G_5 \times G_6$ and $G_2 \times G_3$. For quality of fruit, the crosses $G_2 \times G_6$, $G_4 \times G_7$ and $G_6 \times G_8$ were promising for dry matter, the crosses $G_2 \times G_3$, $G_1 \times G_5$ and $G_2 \times G_4$ had useful significant negative heterosis for ortho-dihydroxy phenol content of the fruit.

The comprehensive analysis on combining ability indicated that the dominance variance was higher than additive variance for all the 26 characters studied except for number of flowers per inflorescence, suggesting the non-additive gene effects. The results of pooled *gca* and *sca* analysis revealed that, among the parents, three (CO-2, Melavanki spineless and Melavanki cluster-II) were found to be high combiners (H) and remaining five (Manjari Gota, Malapur Local, Melavanki Cluster-I, Melavanki spined and Kudachi Local) were low combiners. However, among the 28 hybrids, 19 crosses were found most heterotic for most of growth and yield parameters and among these hybrids, the fruits of the crosses $G_2 \times G_8$ and $G_6 \times G_7$ had high market appeal (>3.0 scores). Most of these crosses had low incidence of bacterial wilt and shoot and fruit borer compared to commercial hybrid Kalpataru under natural epiphytotic condition.

NUTRIENT MANAGEMENT STUDIES IN TURMERIC (*CURCUMA LONGA* L.) CV. SALEM

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ABSTRACT

FIELD experiment was conducted of nutrient management studies in (*Curcuma longa* L.) cv. Salem at the ARS, Arabhavi on medium deep black soil during the year 2001-2002. Both experiments were laid out in RBD with three replications.

The first experiment consisted of eight treatments of inorganic and organic manures. Application of 180:90:90 NPK kg/ha (RDF) + FYM 25 t/ha has resulted in higher plant height (51.06 cm), number of leaves (9.30 per plant), number of tillers (2.46 per plant), leaf area (4629.6 cm²) and leaf area index (4.58) at 180 days after planting.

Application of RDF + FYM 25 t/ha produced significantly higher fresh rhizome yield (22.61 t/ha) cured rhizome yield (4.93 t/ha) curcumin content (3.86%) and uptake of N,P and K (149.9 49.2 and 251.2 kg/ha, respectively).

Among the eight treatments application of FYM alone (25 t/ha) has recorded high C:B ratio (1:3.41) followed by 50% RDF+ Vermicompost @ 2.5 t/ha (1:2.65).

Second experiment consisted of 13 treatments with inorganic and micronutrients. In chelated and unchelated zinc and iron nutrition studies application of RDF + 10 kg ZnSO₄/ ha has resulted in higher plant height (50.60 cm) and number of leaves (9.93 per plant) at 180 days after planting. Fresh rhizome yield (20.66 t/ha) curing percentage (22.56%) cured rhizome yield (4.63 t/ha) and uptake of NPK nutrients (150.0, 44.3, 276.0 kg/ha, respectively) were higher in the treatment supplied with RDF + 10 kg ZnSO₄/ha.

With respect to micronutrient application of RDF + 10 kg ZnSO₄/ha has recorded higher C:B ratio (1:2.70) where as control recorded lower C:B ratio (1:1.66).

PREVALENCE AND ASSESSMENT OF OBESITY AMONG HIGH SCHOOL CHILDREN OF DHARWAD CITY

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ABSTRACT

The investigation focused on prevalence and assessment of obesity among high school children of Dharwad city during 2001-2002. A total of 1000 children aged 12-17 years in urban Dharwad were randomly selected for the study. The prevalence of obesity ($>85^{\text{th}}$ per centile of BMI-for-age) was 5.8 per cent and super obesity ($>95^{\text{th}}$ per centile of BMI-for-age) was 0.9 per cent. The prevalence of grade I obesity ($\text{BMI} > 25\text{-}30$) was 3.7 per cent and grade II obesity ($\text{BMI} > 30$) was 0.6 per cent. More number of females were obese compared to males. About 26.6 per cent of abdominal obesity ($\text{WHR} \geq 0.80$ for females and ≥ 0.95 for males) was evident in the present investigation. There was a clear gender demarcation in prevalence of abdominal obesity, females registering a higher prevalence (25.2%) compared to their gender counterparts (1.4%). The body fat components like percentage body fat, fat mass, fat free mass and fat mass index were higher in the obese children as compared to their lean counterparts. Among the weight/height indices, BMI was found to be a good indicator of obesity among children. Family history of obesity, frequent eating outside the home, soft drink consumption, high intake of energy, fat, carbohydrate, saturated, monounsaturated, polyunsaturated fatty acid, per cent energy from fat, cholesterol and fibre might have influenced the obesity. The low physical activity was one of the most striking aspects which might have contributed to obesity among children. Resting metabolic rate was higher in obese children. However, total daily energy expenditure had no influence on obesity. Majority of obese children were at higher and medium risk. Females were at higher risk compared to males to have adult life non communicable diseases such as dyslipidamia, non-insulin dependent diabetes mellitus, hypertension, gall bladder diseases, osteoarthritis and cardiovascular diseases.

NUTRITIONAL, FUNCTIONAL AND UTILIZATION STUDIES ON BARNYARD MILLET (*ECHINOCHOLA FRUMENTACEA* LINK)

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ABSTRACT

Barnyard millet (*Echinochloa frumentacea*) is one of the fastest growing of all the millers. An investigation was undertaken in the Department of Foods and Nutrition, University of Agricultural Sciences, Dharwad to evaluate the physico-chemical properties, nutritional quality and utilization of Barnyard millet. Physical, hydration and cooking characteristics were studied by standard procedures. Moisture, crude protein, fat and total minerals were estimated by employing AOAC methods (Anon., 1990). Calcium, iron, sugars, dietary fibre and in vitro starch and protein digestibility were estimated by standard procedures. Calorific value and amino acid composition were computed. Milling recovery on a bulk sample was assessed by domestic methods. Barnyard millet was incorporated at varying levels of 0, 25, 50, 75 and 100 per cent in common traditional foods. The investigation revealed variation in physicochemical and nutritional characteristics. Color of the dehulled grains ranged from dull cream to brownish cream. Thousand grain weight, volume, density, hydration and swelling capacities ranged between 2.22 to 2.68 g, 1.80 to 2.50 ml, 1.07 to 1.40 g/ml, 0.22 to 0.71 and 0.55 to 1.05 g/1000 grains, respectively. Grain weight and volume increased significantly after cooking (84.61 to 133.23 and 190.36 to 253.33%, respectively). Variation in moisture (8.15 to 9.84%), protein (8.34 to 15.39%), fat (3.20 to 9.84%), carbohydrate (54.44 to 66.19%) and calorific values (287 to 958 kcal) were observed. Dietary fibre content was high (10.50 to 15.85%) with fair amounts of soluble (3.50 to 6.50%) and insoluble dietary fibre (6.50 to 10.50%). In vitro starch and protein digestibility ranged from 20.75 to 28.81 and 74.92 to 85.86 per cent, respectively. Lysine was the most limiting amino acid. Substitution of millet in idli, dosa and Chakli increased protein, fat, calcium, iron and dietary fibre contents, whereas the carbohydrates and calorific values decreased. Replacement of sorghum with millet increased protein and fat but decreased carbohydrate, energy, calcium, iron and dietary fibre contents implying specific end uses in dietetics.

GRAIN QUALITY CHARACTERISTICS AND PRODUCT EVALUATION OF SORGHUM CULTIVARS GROWN FOR CONVECTIONAL USE

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ABSTRACT

IN India, almost the entire sorghum grain production is utilized for human consumption. Our Indian farmers have been growing sorghum cultivars for specific and use viz., *roti*, *kadabu* and pops. However, these cultivars have not been evaluated for the quality of other convectional products. Hence, the present study was undertaken to investigate the suitability of sorghum cultivars for selected products.

An investigation on physico-chemical, functional and product qualities of traditional foods viz., *bana* and *vadi* prepared from conventionally grown *roti* (M35-1, CSH-13), *Kadabu* (AKL-local, GLB-local) and popping (Shiggaon, Pudalkatti) cultivars was studied. A survey on documentation of consumption of sorghum based products at household and its availability at market was also carried out during 2001-2002.

The 1000-kernel weight, volume and density varied significantly among the cultivars and also between the cultivars of *roti* and popping 1000-kernel weight, volume of *roti* cultivars were higher than *kadabu* and popping. *Roti* cultivars also had higher protein, fat and total amylose content. Popping cultivars recorded higher ash and starch content. Whereas, *kadabu* cultivars had higher crude fiber and lower soluble amylose contents. Functional characteristics for grain and flour varied significantly among the cultivars. The *bana* and *vadi* prepared from *roti* cultivars were highly acceptable for all organoleptic characteristics whereas, *kadabu* cultivars showed poor acceptability. Consumption pattern revealed that majority of households were consuming sorghum products occasionally. *Roti*, *mudde*, *steamed kadabu*, *vadi* and *aralu* were most common sorghum products prepared by the majority of households. Some convectional products had a special significance in local festivals and ceremonies. Majority of shops were selling mainly *roti* cultivars and *roti* was the only ready to eat, convenient, processed product of sorghum available in the market. Before sorghum disappears completely from the diet of regular consumer, there is an urgent need to explore grain quality characteristics for diversified application to meet the need based consumer demands.

VARIETAL SUITABILITY OF RICE (*ORYZA SATIVA* L.) FOR CONVENTIONAL PROCESSING

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ABSTRACT

Rice production is widely scattered throughout the world. Various kinds of rice are utilized in the preparation of specific products and convenience foods in various countries. The present study was undertaken to identify suitable rice varieties for conventional processing and to document the conventional and newly developed rice based convenient products. Physical and chemical characteristics of 15 rice varieties were analysed by standard procedure. Paddy varieties were evaluated for different conventional processing methods *viz.*, milling, popping, puffing and flaking. The information on documentation of consumption of conventional and newly processed rice products at household level, their commercial availability in local market and the type of rice processing units existing in local area were collected by questionnaire method. The rice varieties showed a wide significant variation for physico-chemical and processing qualities. Grain dimensions, L:B ratio, thousand kernel weight, volume and bulk density, total amylose and hot water insoluble amylose content were strongly related to processing quality of rice varieties. The optimum total amylose content 27.60 per cent and 13.40 per cent (db) hot water insoluble amylose of rice variety were found to be the best combination for better expansion ratio of puffed and popped rice. The rice varieties possessing better milling quality have also exhibited better popping, puffing and flaking qualities. Intan, a commercial cultivar showed superior puffing and popping qualities over the newly developed rice varieties (Prasanna, MTU-1001, Mugad-basumati, Pusa-basumati) as well as earlier varieties (Dodiga, Udarsali, Navali etc.). Similarly, Navali, Abhilash, Dodiga commercial cultivars were also found to be good for flaking. The rice varieties (Intan, Navali, Dodiga, Udarsali, Abhilash) having high amylose content, optimum cooking time and intermediate gelatinization temperature were most suitable for conventional processing. The water absorption and cold swelling properties of expanded rice and flaked rice showed potential for possible industrial use. Survey of conventional processing units revealed that, only few units were following modern techniques like roller flaking unit. There were more than 15 convenient conventional rice products available in the local market and were regularly consumed at household level, whereas very few newly developed products like instant *idli* mix and infant foods were existing. Since popped, puffed and flaked rice products have longer shelf-life, there is a need to develop value added convenient products to the consumers.

NUTRITIONAL AND HEALTH PROFILE DURING MENARCHE AND SEASONAL VARIATIONS IN IRON STATUS OF ADOLESCENT GIRLS

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ABSTRACT

An investigation was undertaken with an objective of documenting nutritional and health profile during menarche and testing the seasonal variations in anthropometry, dietary intake anemia status and morbidity pattern among 80 adolescent girls between 13 to 15 years of age from two villages and areas each of Dharwad. The study was carried out in three seasons viz., summer (February – May), rainy (June – September) and winter (October – January). Information regarding age at menarche, problems faced during and prior to menstruation, foods given and avoided during menarche was collected through personal interview method. Seasonal variation in nutritional status of adolescent girls were assessed by anthropometry, dietary intake, clinical examination and hemoglobin status in different seasons. Seasonal changes were not reported in the onset of menstruation problems though maximum number of rural and urban subjects suffered from stomachache, body pain, waist pain and depression during and prior to menstruation.

Irrespective of locality, the selected subjects recorded higher values of height, weight, waist and hip circumferences during winter (149.32 cm, 36.26kg, 56.84cm and 72.76 cm respectively) followed by rainy (148.21cm, 35.45kg, 56.71cm and 72.42cm respectively) and summer (148.02cm, 34.90kg, 56.46cm and 72.39 cm respectively). But all the girls were shorter and lighter compared to NCHS standard at 50th percentile. The adolescents had inadequate intake of energy and blood forming nutrients compared to ICMR recommendations in all the seasons irrespective of locality except folic acid (113.9ug) ascorbic acid (55.9mg) and copper (2.9 mg) during rainy season which exceeded the recommendations. Irrespective of age and locality, the subjects recorded higher mean hemoglobin during winter (9.5 ug/dl) and rainy (9.47 g/dl) seasons compared to summer (9.21 g/dl), but seasonal variations were not reported in any of anemia symptoms. However morbidity among the subjects was reported to be more during rainy season.

STUDIES ON THE EFFECT OF SCOURING, BLEACHING, MERCERIZATION AND CLEANSING AGENTS ON PHYSICAL PROPERTIES OF NATURALLY COLOURED COTTON AND WHITE COTTON YARNS

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ABSTRACT

The present investigation entitled "Studies on the effect of scouring, bleaching, mercerization and cleansing agents on the physical properties of naturally coloured cotton and white cotton yarns" was carried out during 2001-02 at Dharwad. Three colour cotton genotypes namely Hirsutum Cream Cotton-1 (HCC-1), Hirsutum Colour Cotton-7 (HCC-7), Dharwad Brown Hirsutum -12 (DBH-12) and one cotton Jayadhar were select present study. The experiment was carried out at yarn stage included treating the yarns with scouring agents viz., soda ash (S_1), a mild alkali and caustic soda (S_2), a strong alkali. The S_1 and S_2 scoured genotypes were separately bleached with two bleaching agents viz., hydrogen peroxide (B_1) and sodium hypochlorite (B_2) and mercerized with strong caustic soda. The survey was conducted to collect information regarding various cleansing agents used for domestic laundering. Based on the survey results four cleansing agents viz., Wheel cake, Rin Supreme cake, Wheel powder and Surf Excel detergent powders were selected. The S_1 and S_2 scoured genotypes were washed upto ten washes. After scouring, bleaching, mercerization and fifth and tenth washings the genotypes were assessed for single yarn strength and change in pigmentation using computer colour matching system under daylight, tungsten, tubelight-83 and tubelight-84 illuminations. There was increase in the single yarn strength among all the genotypes on scouring, but the colour genotypes showed better improvement when scoured with caustic soda. Scouring led to yellowing of white cotton. Remarkable increase in yarn strength was achieved on mercerization over control. Washing did not adversely affect the durability of the genotypes but infact enhanced the strength upto fifth wash. Hypochlorite bleaching did enhance the single yarn strength of all the genotypes where as hydrogen peroxide reduced the same. Scouring, mercerization and washings enhanced the pigmentation of colour genotypes. Bleaching drastically faded the pigment of colour cotton while Jayadhar regained the brightness on bleaching.

A CRITICAL ANALYSIS OF STRESS AND SOCIAL AWARENESS AMONG FEMALE TEACHERS OF COLLEGES

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ABSTRACT

A study on critical analysis of stress and social awareness among female teachers of colleges was carried out during the year 2001-2002. The purposive sample consisted 150 females' teachers from 15 colleges. The tools used were. Stress scale by Bhagwatwar (2000), Social Awareness inventory by Sheldon (1996), self structured demographic variables and physical health schedule.

The main findings of the study are, majority of the female teachers experience medium level of stress. More number of the female teachers had medium level of social awareness. All the height forms of social awareness were positively and significantly related to each other. Similarly, self respective and others perspective were also significantly and positively correlated.

Stress and social awareness were not significantly correlated. Age, length of service and caste were negatively and significantly related with stress, whereas, professional achievement was positively and significantly related with stress. Social awareness was negatively and significantly related with education and professional achievement, whereas, caste, income and health (chronic disease) were positively and significantly related with social awareness. The regression analysis revealed that service and professional achievement were significantly contributing for the variation of stress among female teachers. Correspondingly, education, service, caste, income and chronic disease were found as significant contributors for social awareness among female teachers.

IMPACT OF ICDS PROGRAMME ON PHYSICAL GROWTH AND COGNITIVE DEVELOPMENT OF PRE-SCHOOL CHILDREN

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ABSTRACT

Impact of ICDS on physical growth and cognitive development of preschoolers studied on a sample of 80 preschool children of age 5¹/₂ to 6 years revealed that majority of non-ICDS children fell under below average category of cognitive ability, while children of ICDS fell under average category. Two groups of preschool children one attending ICDS and the other not attending ICDS regularly were matched for age, gender and socio-economic status. The cognitive development of preschoolers was measured by Pandey's scale of cognitive development (1992). Tansey bar weighing scale and anthropometric rod was used to measure weight (Kg) and height (Cm) respectively. Fibre glass measuring tape was used to measure the circumference of the head, chest and arm. Mother's knowledge and socio-economic status (SES) was assessed using developed tools.

The 't' test was applied to know whether the two groups were matched on socio-economic variables. Chi-square (χ^2) test of association, two factorial analysis of variance was used for comparing the differences on developmental outcomes of preschoolers of ICDS and non- ICDS groups.

A significant impact on physical growth and nutritional status was also noticed. Mother's knowledge regarding health, nutrition and child care practices was also significant better among ICDS group in comparison with non- ICDS.

In case of ICDS group education of father and mother had significant influence on the physical and cognitive development of preschoolers. Children from joint families were significantly better than nuclear which implies that in addition to the influence of ICDS programme, children whose father and mother were better educated had better developmental outcomes. But in case of non- ICDS group children whose father had better occupational level had better developmental outcomes. Education of both father and mother had significant influence on mother's knowledge in case of ICDS group only.

PROBLEMS AMONG RURAL ANGANWADI WORKERS RELATED TO THEIR JOB AND FAMILY

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ABSTRACT

THIS study was conducted in Dharwad taluka during 2002 aimed at getting a comprehensive picture of anganwadi worker's problems. Hundred anganwadi workers in 28 selected villages were interviewed personally. Pre-tested interview schedule interview guide and observation were the tools used.

Majority of respondents had a high level of knowledge about objectives of ICDS and their duties in anganwadi. This was positively and significantly related with their age experience and training.

Majority (92%) complained of low honorarium. More than 50% respondents reported lack of fuel for supplementary feeding, hesitation of pregnant women to take iron tablet and undergo immunization, lack of time to carry out pre-school education properly and lack of water and toilets in anganwadi. Some respondents (38%) reported nonco-operation from government health functionaries in implementing health component of ICDS. Collecting village information not related to ICDS for government is another problem (36%).

Interference with their childcare duties was the main family problem of widows and divorcees. Majority of (73%) unmarried subjects reported that, anganwadi work created problems in housekeeping. Inability to use own salary was the main family problem of married respondents.

Married respondents who stayed in a different village had significantly more number of job related problems than other categories of respondents. Married Hindu respondents and those who were staying in a different village had significantly more number of family problems than unmarried, SCs, STs and those who lived in the same village. Respondents belonging to nuclear family and those who lived less than 10 years in rural areas than others had more personal problems at 5% level of significance.

These results imply the need to increase the present honorarium along with converting their honorary post to the government job. Results also imply the need to improve the anganwadi building with provision for sufficient indoor and outdoor space, toilets and drinking water supply. There is a need for sufficient equipment to carry out pre-school education, health and nutrition education and supplementary feeding in anganwadi.

HEALTH PROBLEMS AMONG UNDERGRADUATE FEMALE HOSTELERS IN HUBLI AND DHARWAD CITIES

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ABSTRACT

Present study aimed at examining the health problems of undergraduate female hostellers in Hubli and Dharwad cities during 2002. One hundred and fifty randomised hostellers from ten ladies hostels were interviewed personally. Pre-tested interview schedule, interview guide and non-participant overt observation of the hostellers were the tools used. Percentages, correlation and 'Z' test were for analysis.

Majority of the respondents reported problems related to communication and entertainment facilities, in addition to reporting inadequate water, bathrooms, toilets, room facilities and mass facilities.

More than one third of the respondents suffered from general health problems which were positively correlated with their problems related to hostel life. More than three fourths of the respondents reported one or more menstrual problems.

Most of the respondents expressed their relationship with warden and other staff in the hostel as good. The effect of relationship with the hostel warden on the health problems of hostellers was found to be negatively related but non-significant.

Most of the wardens were found to carry the warden ship in addition to their work either as teacher or as government department officials. Most of them were having less than 5 years of experience. All wardens expressed one or more problems in maintaining hostel and none liked the warden ship.

The results imply that to improve the hostellers there is a need for improving sanitation and hygienic of mess, food, water, toilets and bathrooms. In addition, and good room facilities, communication and entertainment facilities are to be provided to create a homely atmosphere for hostellers. The results imply the need for wardens who have training in counseling, institutional management and aptitude towards their work. Wardens needs to be given more authority to bring about desirable changes in the hostel and for providing better facilities.

IMPACT OF ICDS ON PSYCHOMOTOR MENTAL AND PHYSICAL DEVELOPMENT OF RURAL TODDLERS

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ABSTRACT

A study on impact of ICDS on psychomotor, mental and physical development of rural toddlers was conducted during the year 2002. A sample of 80 toddlers (2½-3 years) each formed cluster of two growths attending ICDS regularly and not attending ICDS or irregular. The two growths were matched for age, gender and socio-economic status. The motor and mental development of toddlers was measured by Bayley scale of infant development (1993). Motor's knowledge was assessed by interviewing mothers with mother's knowledge scale. Socio-economic status (SES) was assessed using a developed scale. Tansy bar weighing scale and anthropometric rod was used to measure weight (kg) and height (cm) respectively. Fibre glass measuring tape was used to measure the circumference of the head and chest. The information regarding ailments and diseases suffered by the child was gathered by using a developed scale. The 't' test was applied to know whether the two groups were matched on socio-economic variables. Chi-square (χ^2) test of association, two factorial analysis of variance was for used for comparing the differences on developmental outcomes of toddlers of ICDS and non-ICDS groups.

Results indicated that majority of toddlers of non-ICDS group fell under below average category of motor and mental development, while toddlers of ICDS group fell under normal category. Gender differences in psychomotor and mental development existed only in case of non-ICDS group. The ICDS had a significant impact on motor and mental development and nutritional status of children and reduced morbidity and also enhanced mother's knowledge regarding health, nutrition and child care practices.

In case of ICDS group caste, family type and size and ordinal position had significant influence on the development of toddlers. Whereas in case of non-ICDS group education of mother and ordinal position had significant influence on development of toddlers. Type of family was the only factor, which influenced mother's knowledge in case of ICDS group indicated that joint family was better nuclear family.

INVOLVEMENT OF RURAL WOMEN IN SELECTED POVERTY ALLEVIATION PROGRAMMES

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ABSTRACT

The present study was conducted in the year 2001-2002 in Dharwad district with a sample size of 120 beneficiaries of selected NGO Bharatiya Agro Industries Foundation (BAIF) under the Jana Uthan and Shakti Schemes who had taken income generating activity as a venture and collected data on socio-personal characteristics, knowledge and opinion towards the programme, economic benefits derived problems faced and suggestions for improvement of the programme, with the help of pretested structured schedule.

The results of the study revealed that majority of the beneficiaries were young age, illiterates, single, landless, above poverty line group, belonged to forward caste, nuclear family with small family size and living in mixed type of house. Majority were possessing radio. A sizeable percentage of the beneficiaries had medium level of social participation, extension participation and mass media participation. Majority of the beneficiaries (48.33%) had medium level of knowledge and exhibited highly favorable opinion (35.83%) towards the programme. Knowledge about the programme was positively and significantly related. Opinion towards the programme was positively and significantly related with education, social participation and extension participation.

Dairy enterprise was most preferred subsidiary occupation followed by nursery raising. Higher cost benefit ratio was obtained from vermicomposting (1:4:30) followed by dairy enterprise (1:3:60) and tailoring (1:3:20) cent percent of the beneficiaries were in the habit of saving money, for the purpose to expand the financial base, for education of children and to expand their business activity in order of preference.

Major constraints faced by the beneficiaries were difficulty in starting new activities (35.00%) and insufficient credits (31.67%). Important suggestions were to provide additional loan, supply of animal feeds at low cost and adequate training for effective implementation of income generating activities through poverty Alleviation Programmes.

MICRO AND MICROANATOMY OF LIVER AND PANCREAS IN INDIAN DONKEY (*Equus asinus*)

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ABSTRACT

The present study was carried out to know the gross morphology, histomorphology and histochemistry of the liver and pancreas of the Indian donkey

The gross morphological studies revealed their location, position shape and color. Hepatic angiography revealed venous drainage system within the lobules of liver.

Histologically, the liver was covered by a capsule made up thin mesothelium and thick fibrous layer with few smooth muscle fibres. The scant connective tissue septa divided the parenchyma into indistinct lobes. The paraecnhyma of the gland consisted of two type hepatocytes (i.e. vacuolated and granulated), sinusoids and portal triad. The sinusoids were tubular and narrow with kupffer cells lining lymphocytes, Neutrophils, eosinophils and erythrocytes were noticed in the sinusoids. Fine network of reticular fibres were noticed around hepatocytes and sinusoids. Encapsulated pancreas was divided by connective tissue septa into lobules. The exocrine portion of the gland consisted of acini lined by simple cuboidal epithelium. Ducts, blood vessels, nerves and ganglion were noted in septa. The acini were surrounded by reticular fibres. The ductular system consisted of intercalated intralobular, intralobular and main excretory duct which open along with hepatic duct at hepato-pancreatic ampulla into duodenum. Endocrine portion consisted of group of small cells which were in the form of clusters or scattered in the parenchyma. Three types of cells were identified by Maldonado's staining method.

Histochemically, the glycogen was present more in the centrolubular hepatocytes than the periportal hepatocytes. The hepatic capsule, sinusoidal lining, central vein and connective tissue showed strong PAS positive reaction, whereas in the pancreas, the apical border of interlobular and large pancreatic duct epithelium. Showed strong reaction for PAS and mucin and acini and ducts for alcian blue at 2.5 pH.