

**RAPD ANALYSIS FOR TAGGING *H₂* LOCUS OF WILT (*FUSARIUM*
OXYSPOURUM FSP. CICERI) RESISTANCE IN CHICKPEA (*CICER*
ARIETINUM L.)**

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ABSTRACT

The major constraint for increasing yield in chickpea is the susceptibility of presently grown cultivars to Fusarium wilt. Screening of large segregating populations and development and maintenance of uniform wilt sick plots are the major problems encountered for the development of high yielding and wilt resistant genotypes. Identification of molecular markers for resistance will solve such problems and increase the efficiency of conventional breeding. The present investigation was carried out at College of Agriculture, Dharwad to identify RAPD markers linked to *h₂* LOCUS of Fusarium wilt race 1 resistance. The RILs developed by crossing a late wilter, K-850 (*h₁h₁H₂H₂h₃h₃*) with a resistant genotype WR-315 (*h₁h₁h₂h₂h₃h₃*) were screened for their reaction to race 1 of Fusarium oxysporum fsp. ciceri in wilt sick plot at ICRI SAT, Hyderabad and was further confirmed in wilt sick pots in the glass house. The RILs showed a 1:1 segregation ratio for wilting (susceptible) and no wilting (resistant) suggesting single locus segregation of late wilting. Ten out of 123 oligonucleotide primers produced polymorphism between the parents. In bulk segregant analysis three primers (OPK-09, OPK-13 and OPA-07), produced an extra amplified product in susceptible parent and susceptible bulk. The linkage analysis suggested two RAPD markers (OPK-09₁₈₀₁ and OPA-07₁₆₀₄) are linked to *h₂* locus of susceptibility. The distance between *h₂* locus and OPK-09₁₈₀₁ was 8.2 cM and that with OPA-07₁₆₀₄ was 12.90 cM on either side of the gene.

Analysis of variance among the RILs indicated high to moderate variability for seed yield, number of pods, test weight and number of primary branches. High heritability estimates coupled with high genetic advance indicated the importance of additive genetic variance in the expression of those characters. Number of pods and test weight had high positive direct effects on yield and these should be used as primary selection criteria. Among the RILs, 29 recorded significantly higher yield than national check A- 1. Out of which 14 were resistant to race 1 of Fusarium wilt.

**TRITROPHIC INTERACTIONS INVOLVING HOST PLANTS , *HELICOVERPA*
ARMIGERA (HUBNER) AND *TRICHOGRAMMA* SPECIES**

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ABSTRACT

In studies undertaken to decipher various facets of tritrophic interactions involving host plants, *Helicoverpa armigera* and *Trichogramma* species during 2000-2001 and 2001-2002 at Agricultural College, UAS, Dharwad, *Trichogramma chilonis* made higher number of encounters (1 3.44) with host eggs in the presence of cotton leaf. Among five species, *T.chilonis* was most effective with 25.92 per cent parasitism and among two substrates, cotton leaf permitted greater parasitism (21.40 and 33.82 per cent, at 3 and 5 days after release of parasitoids, respectively). *Gossypium herbaceum* L (Cv. Jayadhar) permitted highest parasitism (38.76%) among four species of cotton. Bud wash derived from Jayadhar cotton variety elicited highest attraction of *T.chilonis* (5.70 adults) compared to other genotypes. Vegetative part (leaf wash) effected greatest attraction (6.78 *T.chilonis* adults) compared to flower and boll wash. Abhadita with open canopy permitted greatest parasitism (23.20%) compared to other genotypes with bushy canopy. Vegetative phase of cotton allowed the highest parasitism (41.20%) than the reproductive phase. Among the different food sources honey afforded maximum fecundity (12.39 eggs). Experience of pre exposure to kairomone enabled *T.chilonis* to spend more time (11.25 min.) on host eggs. Among five species, *T.chilonis* was most agile with 5.55 adults getting attracted towards frass mixture and 7.52 adults towards scale extract. Spray of Jayadhar leaf extract lead to decline in *H. armigera* egg load (0.66), BOB (10.95/plant) in Laxrmi cotton variety with increased parasitism (27.42%), GOB (17.92/Plant) and yield (4.85q/ha). Among five *Trichogramma* species *T. chilonis* caused greatest parasitism (41.92%) on Morden sunflower variety and leaf wash attracted higher number of *T. chilonis* adults (6.50) compared to capsule and petal. Among different cultivars BSH-1 effected the highest parasitism (46.72%).

DESIGNING TEXTILE MADE- UPS FROM AHIMSA SILK

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ABSTRACT

The present study entitled "Designing Textile Made-ups from Ahimsa Silk" was carried out in 2000~03 at Dharwad with objectives to explore the existing technology of cooking mulberry pierced cocoons, techniques of spinning, degumming and dyeing of Ahimsa silk, to ascertain the possibilities of producing spun silk made-ups on simple and complex looms, to assess their physical characteristics and tactile properties and to enumerate the economic analysis of newly designed made-ups. The bivoltine and multivoltine pierced cocoons were softened in plain water, soap + soda, Eze detergent and oxyphon oil and spun on CSTR Motorized Spinning Machine. Keeping ahimsa silk as weft, three, made-ups viz., dress material in cotton, art silk and filatured silk, shirtings in cotton, tericot and filature silk and furnishings in cotton and polyester as warp were woven at different handloom weaving centres of Karnataka. These made-ups were assessed for mechanical and functional properties as well as hand and feel by subjective evaluation. The experimental results revealed that cocoons cooked in soap + soda evolved greater length of finer yarn. Further, physical properties of test samples exhibited that union made-ups were woven in finer yarn count with better cloth set than the control sample. Among the made-ups, with warp as cotton, art silk and tericot exhibited higher bending path with poor crease recovery angle. Of the test samples, control and made-ups woven with art silk, tericot and polyester as warp possessed greater tensile strength than the others. The control sample showed higher resistance to abrasion than the union made-ups. Control sample, D_F and S_F made-ups exhibited good drapability expressing the fabric softness, pliability and resiliency. The subjective evaluation revealed that D_A, S_F and F_C made-ups were most preferred by textile experts. The total production cost of control sample and made-ups of D_F, S_F and F_C was maximum.

**RESPONSE OF POP SORGHUM (*SORGHUM BICOLOR* (L.) MOENCH)
GENOTYPES TO ROW SPACINGS AND FERTILIZER LEVELS IN NORTHERN
TRANSITIONAL ZONE OF KARNATAKA**

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ABSTRACT

A field experiment was conducted to study the response of pop sorghum genotypes to row spacings and fertilizer levels in medium deep black soil under rainfed condition at MARS, UAS, Dharwad during kharif 2002. The experiment was laid out in a Randomized Complete Block Design with 18 treatments comprising of three genotypes, three row spacings and two fertilizer levels. The treatments were replicated thrice. Grain (1505 kg ha^{-1}) and stover yields (25.5 t ha^{-1}) were higher with Pudukalakatti owing to higher grain number, grain weight per ear and 1000-grain weight. Maximum protein per cent in grains (7.28), popping percentage (81.4) and expansion volume of pop (9.89 ml g^{-1}) were observed in Shiggaon genotype. Among different row proportions, maximum grain (1410 kg ha^{-1}) and stover yields (23.4 t ha^{-1}) were obtained with 45 cm row spacing. Significantly lower grain and stover yields were obtained in narrow row spacing of 37.5 cm. Protein percentage in grain and in pop, popping percentage and popping expansion volume, were higher in 60 cm row spacing which was on par with 45 cm row spacing. Higher uptake of N, P and K ($197, 30.0$ and 163 kg ha^{-1} , respectively) was recorded with 45 cm row spacing.

Grain (1374 kg ha^{-1}) and stover yields (22.50 t ha^{-1}) were also higher with application of $80:40:40 \text{ kg N, P}_2\text{O}_5 \text{ and K}_2\text{O ha}^{-1}$. Popping percentage and popping expansion volume were higher with $40:20:20 \text{ kg N, P}_2\text{O}_5 \text{ and K}_2\text{O ha}^{-1}$. Higher uptake of N, P and K was observed with higher dose of fertilizer. Higher fertilizer level also had high residual soil nutrient status at crop harvest. Thus, the results revealed higher net returns with genotype Pudukalakatti grown at 45 cm row spacing and supplied with $80:40:40 \text{ kg N, P}_2\text{O}_5 \text{ and K}_2\text{O ha}^{-1}$ both in terms of grains and pops production (Rs.21,966/- and Rs.65,929/-, respectively).

EFFECT OF PLANTING METHODS AND MULCHING ON GROWTH AND YIELD OF GROUNDNUT UNDER RAINFED CONDITIONS

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ABSTRACT

A field experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during kharif 2002 to evaluate the effect of planting methods and mulching on growth and yield of groundnut under rainfed conditions. The experiment consisted of five main plot treatments (methods of groundnut planting) and three subplot treatments (mulching) with three replications laid out in split plot design. The cultivar used was JL-24. The crop was raised with recommended agronomic practices

Methods of groundnut planting showed significant differences with respect to morphological characters. 2:1 skip row method produced significantly taller plants, more number of branches plant⁻¹, more number of nodules plant⁻¹ and more nodule dry weight plant⁻¹. Partitioning of dry matter in reproductive parts was also more in 2:1 skip row method of groundnut planting compared to other methods [4:1 skip row, broad bed and furrow with 2 rows, BBF (3 rows) and flat bed method]. 2:1 skip row and 4:1 skip row method of groundnut planting produced significantly higher dry pod yield (2936 and 2923 kg ha⁻¹, respectively) and kernel yield (2157 and 2136 kg ha⁻¹, respectively) as compared to other methods of groundnut planting. The yield components such as total number of pods plant⁻¹, dry pod weight plant⁻¹, shelling percentage, sound mature kernels (%) and harvest index were higher in 2:1 skip row method of planting.

Polythene mulching and groundnut shell mulching conserved more moisture as compared to without mulch treatment. Soil temperature was 2-8°C higher in polythene mulch treatment as compared to groundnut shell mulching and the treatment without mulch. The performance of individual plants with respect to morphological parameters, growth and yield parameters were superior with polythene mulching. And also dry pod yield (3144 kg ha⁻¹), kernel yield (2341 kg ha⁻¹) and quality parameters were higher in polythene mulching as compared to groundnut shell mulching and the treatment without mulch.

Dry pod yield, kernel yield and oil yield (3539, 2654 and 1119 kg ha⁻¹, respectively) were significantly high in 2:1 skip row with polythene mulching treatment as compared to other treatment combinations. 4:1 skip row and 2:1 skip

row methods of groundnut planting recorded higher B:C ratio (1.90 and 1.90, respectively) compared to other planting methods, Among the mulching treatments, groundnut shell mulch recorded higher B:C ratio (1.99) compared to treatment without mulch (1.86) and polythene mulch (1.60). But 'in combination with planting methods and mulching, 4:1 skip row with groundnut shell mulching recorded higher B:C ratio (2.17) compared to other treatment combinations and proved economically feasible.

PHYSIOLOGICAL BASIS OF INDUCTION OF DORMANCY IN GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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ABSTRACT

A field experiment was conducted at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during kharif 2002 to study the physiological basis of induction of dormancy in groundnut cv. JL-24. The experiment consisted of foliar application of maleic hydrazide at two stages (60 and 80 DAS) with nine concentrations along with control. The experiment was laid out in randomised block design with three replications. The results revealed that MH @ 300 ppm (60 and 80 DAS) significantly increased number of branches, leaf and stem dry matter, LAI, TDM, LAD, CGR, NAR, AGR and SLW followed by application of MH @ 200 ppm (60 and 80 DAS) as compared to control. Higher concentration of MH improved RGR values while the plant height decreased significantly. Among the biochemical parameters, chlorophyll'a', chlorophyll'b'and total chlorophyll contents were significantly more with MH @ 300 ppm (60 and 80 DAS) followed by MH @ 200 ppm (60 and 80 DAS). The important yield and yield components viz., pod yield, haulm yield, kernel yield, shelling per cent and oil content were significantly more with MH @ 300 ppm (60 and 80 DAS) followed by MH @ 200 ppm (60 and 80 DAS) as compared to control.

The post harvest observations (immediately after harvest and 15 days after harvest) revealed that the germination per cent, shoot length, root length and whole seedling length and seedling vigour index were found more in control and these parameters were lowest in treatment with MH @ 300 ppm and this treatment showed more number of dormant seeds. The total phenol contents were more in control and application of MH reduced the contents. The B:C ratio was higher with MH @ 200 ppm (60 and 80 DAS) followed by MH @ 300 ppm (60 and 80 DAS) as compared to control.

QUANTITATIVE CHANGES IN MORPHO-PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERS UNDER RAINFED CONDITONS IN COTTON (*GOSSYPIMUM* SPP.)

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ABSTRACT

A field experiment was conducted during kharif 2002 to study the quantitative changes in morphological and biochemical characters under rainfed conditions in cotton (*Gossypium* spp.) at Agricultural Research Station, Dharwad. The experiment consisted of twelve genotypes belonging to three species of cotton and was laid out in a randomised block design on medium black soil. Genotypes of different species showed significant differences in their growth pattern and dry matter production and distribution into different plant parts. Early maturing genotypes possessed higher dry matter at all the stages mainly because of higher CGR, NAR and leaf area at early growth stages as compared to late maturing genotypes. In addition, these genotypes also possessed higher photosynthetic rate, transpiration, conductance, water use efficiency and relative water content than the late maturing genotypes. The total and 'a' and 'b' components of chlorophyll and proline contents varied significantly among the different genotypes. The early genotype, 4350308 recorded significantly higher proline content at all the growth stages compared to other genotypes. Early maturing *G. hirsutum* species produced higher seed cotton yield (838.8 kg/ha) as compared to *G. herbaceum* (642.2 kg/ha) and *G. arboreum* species (636.2 kg/ha). Among the genotypes, the genotypes 4350308 of *G. hirsutum* produced significantly higher seed cotton yield (893.8 kg/ha) which was mainly attributed to higher boll weight, harvest index, higher proline and chlorophyll contents. Thus, in conclusion, the early maturing cotton genotypes were found to be morpho-physiologically efficient in terms of growth and yield components and escaped drought and heliothis incidence. Thus, early maturing -genotypes could be recommended under rainfed conditions for getting higher yield.

EFFECT OF NUTRIENTS ON POWDERY MILDEW DISEASE RESISTANCE AND YIELD IN BLACKGRAM (*VIGNA MUNGO* L.)

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ABSTRACT

A field experiment was conducted during kharif 2002 to study the effect of nutrients on powdery mildew disease resistance and yield in blackgram at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The experiment was laidout in factorial randomized block design which consisted two genotypes, K-3 and TAU-1 susceptible to powdery mildew with nine foliar treatments viz., control (unsprayed), potassium nitrate (0.5% and 1.0%), manganese sulphate (0.25% and 0.5%), magnesium sulphate (0.5% and 1.0%) and ferrous sulphate (0.25% and 1.0%), manganese sulphate (0.25% and 0.5%), magnesium sulphate (0.5% and 1.0%) and ferrous sulphate (0.25% and 0.5%). The treatments were imposed at 35 and 50 DAS. The powdery mildew incidence and severity increased as the crop advanced towards maturity. All the morphological characters were decreased due to the powdery mildew, whereas the biochemical parameters viz., chlorophyll 'a', chlorophyll 'b', total chlorophyll, phenol content and nitrate reductase from 45-60 DAS. There was a significant reduction in number of trifoliates and leaf area due to disease infestation between 45-60 DAS than at 60-75 DAS. However, these parameters were maximum in the MnSO_4 (0.5%) treatment followed by the application of MnSO_4 (0.25%) and MgSO_4 (0.5%) The maximum control of disease was found with MnSO_4 (0.25%) treatment with PDI of 33.30 as compared to control (90.45). The other nutrient treatments MnSO_4 (0.5%), MgSO_4 , FeSO_4 and KNO_3 at both concentrations also found to offer resistance to the disease with PDI ranging from 34.50 (MnSO_4 0.5%) to 72.55 (KNO_3 1.0%). Foliar application of MnSO_4 (0.5%) recorded significantly higher number of pods per plant, seed per plant, 100-seed weight and yield followed by MnSO_4 (0.25%) and MgSO_4 (0.5% and 1.0%). The cost:benefit ratio of MnSO_4 (0.25%) sprayed twice at 35 and 50 DAS was almost on par with MnSO_4 (0.5%), MgSO_4 (0.5%) and FeSO_4 (0.25%) and hence spray of MnSO_4 (0.25%) can be recommended for the control of powdery mildew disease.

STUDIES ON GENETIC INTROGRESSION IN INTERSPECIFIC CROSSES OF COTTON (*GOSSYPIUM* SPP.)

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ABSTRACT

Due to modernisation of spinning industry, in the order of preference for quality of raw cotton fibre strength (minimum > 23 g/tex) stands first followed by fibre fineness (3.5-4.5 µg/inch), fibre length (various categories) and fibre maturity (>80%). As the present day cultivars could rarely fulfil all these requirements, the present study was aimed at improvement of fibre properties of commercial cultivars.

Investigation was carried out during kharif 2002-03 at Agricultural Research Station, Dharwad Farm, University of Agricultural Sciences, Dharwad. Balanced recombinants with high fibre strength (>24 g/tex), high fibre length (>32 mm, 2.5% SL) and optimum micronaire around 3.0 were derived at F₅ of cross *G. hirsutum* var. DS-28 x *G. barbadense* var SB(YF)-425. Plants with elevated fibre properties were selected from F₂ and BC₁ populations of cross between Jayadhar (*G. herbaceum*) x BCS23 (*G. barbadense*). They were superior in fibre length (24-26 mm) and fibre strength (20-23 g/tex) than jayadhar (20 mm fibre length and 16-17 g/ tex fibre strength). Similarly selected recombinant from cross between A 82-1 (*G. arboreum*) x BCS23 (*G. barbadense*) has fibre length of 24.9 mm (2.5% SL) and 25.9 g/tex fibre strength with 3.3 micronaire value as against 17.9 mm, 18.9 g/ tex and 5.7 respectively of A 82- 1. Plants with 24 g/tex fibre strength and 28 mm fibre length were isolated at F₃ from cross between *G. hirsutum* var. Abadhita x (*G.cot* 1 1 x *G. tomentosum*). Linted hybrid with several intermediate characters was recovered from cross between *G. herbaceum* var. DDhC- 1 1 and lintless diploid *G. anomalum*. Incorporation of gossypol glandless seed and glanded plant trait of *G. australe* in to cultivated types makes them perfect dual varieties. The back cross for the crosses Abadhita x *G. australe* and Jayadhar x *G. australe* was unsuccessful. However, back crosses were made successful by using *G. anomalum* as bridge species.

Genetic diversity analysis among recombinants from cross between DS-28 and SB(YF)-425 through RAPD indicated that recombinants made separate cluster and they were similar by 80 per cent with female parent. Similarly, genetic diversity analysis among recombinants from cross between Jayadhar x BCS23 indicated that two recombinants clustered with male parent (BCS23) and remaining recombinants clustered with female parent (Jayadhar).

HETEROSIS AND COMBINING ABILITY STUDIES FOR ROOT, SHOOT AND PRODUCTIVITY TRAITS IN RABI SORGHUM

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ABSTRACT

Two experiments were conducted at RRS, Bijapur during 2002-03, to know the genetic architecture of the root and shoot characters in rabi sorghum based on estimates of components of variance, extent of heterosis and combining ability analysis. In experimental, twenty-five genotypes (five parents and twenty hybrids) were evaluated for shoot characters under natural ecosystem. In experiment-II, sixteen genotypes were evaluated (four parents and twelve hybrids) in polythene bags to study the root and shoot characters. The genetic analysis showed that the character viz., days to 50 per cent flowering, 500 grain weight, grain number per panicle, grain yield per plant, fodder yield per plant, relative water content and root branching are under control of both additive and non-additive gene action. However, root length, root thickness and root dry weight showed preponderance of additive gene action. But, root to shoot ratio was under the control of non-additive gene action. Most of the crosses showed significant positive heterosis for root characters, grain yield and its components. This suggests the possibility of developing hybrids with high yield and better root system. The highest heterosis for grain yield was observed in CSV 8R x DSV 4 and M 35-1 x DSV 4 in experiment I and II, respectively. High heterosis was manifested by CSV 8R x DSV 4 for grain number per panicle and root number; M 35-1 x CSV 8R for fodder yield and root dry weight and CSV 8R x M 35-1 for root length, root thickness, root branching and root to shoot ratio. Combining ability analysis revealed that DSV 5 followed by M 35-1 showed high general combining ability for grain yield. The crosses DSV 4 x CSV 216R and M 35-1 x DSV 4 showed high sca effects for grain yield. Significant sca effects were observed in the hybrid M 35-1 x CSV 8R for fodder yield; in DSV 5 x DSV 4 for RWC; in DSV 5 x CSV 8R for root number and root length and in CSV 8R x M 35-1 for root length, root dry weight, root branching and root to shoot ratio.

**EFFECT OF DATES OF SOWING, SPACING AND SEED RATE ON SEED YIELD
AND QUALITY OF SUNNHEMP
(*CROTALARIA JUNCEA* L.)**

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ABSTRACT

A field experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during Kharif 2001 to study the effect of dates of sowing. (2nd FN of July, 1st FN of August, 2nd FN of August and 1st FN of September), spacing, (30 cm and 45 cm row spacing) and seed rate (10, 15 and 20 kg per ha) on seed yield and quality of sunnhemp. The experiment was laid out in a split-split plot design with three replications. August 2nd FN sowing recorded significantly higher number of pods per plant (46.18), seeds per pod (10.02), seed yield per plant (23.63 g) and seed yield per ha (836.8 kg) as compared to 1st FN of September. (34.10, 9.46, 13.63 g, 550.2 kg, number of pods per plant, number of seeds per pod, seed yield per plant and seed yield per ha respectively). Row spacing of 30 cm recorded significantly higher number of pods per plant (42.62), seeds per pod (9.82), seed yield per plant (18.97 g), test weight (44.14 g) and seed yield per ha (770.11 kg) over wider row spacing of 45 cm. (39.96, 9.57, 16.57 g, 42.50 g., 706.0 kg, number of pods per plant, number of seeds per pod, seed yield per plant, test weight and seed yield per ha, respectively). The seed rates of 15 kg per ha recorded significantly higher seed yield of 780.5 kg per ha compared to 10 kg/ha (753.5 kg/ha) and 20 kg/ha (680.2 kg/ha). Under Dharwad condition's maximum seed yield of sunnhemp can be obtained by taking sowing during the 2nd FN of August with a seed rate of 15 kg per ha at a row spacing of 30 cm.

EFFECT OF SULPHUR, ZINC AND IRON NUTRITION ON GROWTH, YIELD AND CERTAIN QUALITY PARAMETERS OF SAFFLOWER(*CARTHAMUS TINCTORIUS* L.)

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ABSTRACT

A field experiment was conducted to study the effect of sulphur, zinc and iron nutrition on growth, yield and certain quality parameters of safflower in Vertisol, under irrigated conditions during rabi 2002-03, at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The experiment consisted thirteen treatments with three replications and was laid out in randomized block design.

The results of the investigation indicated that levels of sulphur and their combination with micronutrients significantly increased the seed yield, oil content and protein content of safflower. Among sulphur levels, application of 30 kg S per ha recorded the highest seed yield (1553 kg/ha), oil content (29.1%) and protein content (14.6%) and it was significantly superior over 20 kg S per ha (1426 kg/ha, 28.3% and 13.5% of seed yield, oil content and protein content, respectively) and 10 kg S per ha (1298 kg/ha, 26.9% and 12.3% of seed yield, oil content and protein content, respectively) and RDF (.1 172 kg/ha, 26.3% and 11.3% of seed yield, oil content and protein content, respectively). The combination of sulphur and micronutrients had profound influence on seed yield, oil content and protein content. The treatment receiving 30 kg S per ha with Fe + Zn foliar spray registered the highest seed yield (1765 kg/ha), oil content (29.8%) and protein content (15.8%) and it was significantly superior over most of sulphur and micronutrient combinations and RDF.

Application of 30 kg S per ha recorded the highest nutrient uptake (N, P, K, S, Fe and Zn) by safflower and it was significantly superior over 20 kg S per ha, 10 kg S per ha and control. The treatment receiving 30 kg S per ha + Fe + Zn + foliar spray registered the highest nutrient uptake (N, P, K, S, Fe and Zn) and it was significantly superior over other treatments.

Application of 30 kg S per ha in combination with Fe + Zn foliar spray gave the highest B:C ratio of 3.82 and proved to be economically more feasible. This treatment combination has given Rs. 8,122 high net returns than application of recommended dose of fertilizers.

STUDIES ON ETHANOL PRODUCTION FROM AGRO-RESIDUES

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ABSTRACT

Environmental pollution and demand for energy are the major challenges that the world is facing today, this is due to increase in population and the advances in technologies. Therefore, ethanol is being blended with petrol or diesel @ 20% for conserve the natural resource and decrease the pollution. 90 per. cent of the ethanol is being currently produced from molasses. However due of its higher cost, it is necessary to search an alternate source that is cost effective. According to the statistical analysis, paddy, wheat and sugarcane are the major crops in India. Hence, the present study was conducted to know the potential of these three crop residues for ethanol production. The crop residues were subjected to microbiological and crude enzyme pretreatment to obtain maximum reducing sugars. Among these pretreatment methods combined inoculation of *Phanerochaete chrysosporium* and *Pleurotus* spp in paddy straw (1.27 mg g^{-1}) and bagasse (1.97 mg g^{-1}) and combined inoculation of *Trichoderma viride* and *Phanerochaete chrysosporium* (1.47 mg g^{-1}) in wheat straw was found to be effective in releasing the reducing sugar compared to enzymatic pretreatment. Hence, microbiological pretreatment along with respective substrates were subjected for further studies on ethanol production.

The substrates were further subjected to fermentation of filtrates and fermentation along with the solid substrates. Among these, filtrate fermentation showed maximum release of ethanol (820.80 mg L^{-1}) and *Zymomonas mobilis* was efficient in releasing ethanol from all the substrates. Among the substrates, bagasse recorded maximum release of ethanol compared to paddy straw and wheat straw. Thus, it can be concluded that fermentation of microbiologically pretreated filtrate of bagasse using *Zymomonas mobilis* is the best method for ethanol production.

MARKETING MANAGEMENT OF COCONUT AND ITS PRODUCT IN KARNATAKA

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ABSTRACT

Coconut is an important commercial crop and has great influence in the Indian rural economy. Its cultivation is known in India for time immemorial as the palm is nobly described in ancient Indian literature as 'Kalpavriksha'. The raw nuts in edible copra are important articles of food. The trunk of matured tree is used for construction of houses. The outer husk of nut forms the raw material for coir industry. Tender coconut is used as refreshing drink in summer season. The annual increase in the market arrivals of coconut is observed in Tiptur market and decreasing trend in market arrivals was observed in Arsikere. The market structure of copra and coconut shown that there is a greater degree of competitiveness in the market of commission agent. Production of coconut shown negative response to the price variation. Marketing channels followed by farmers in marketing of copra were found to be in the two important channels, they are as follows,

I Producer --> Commission agent --> Trader

II producer --> Co-operative society --> Trader

In the first channel, copra makers disposed copra through commission agents to the traders. In this channel out of 30 selected copra makers as high as 90 per cent (27 farmers) of the producers marketed about 76.6 per cent (26573 quintals) of their produce.

In channel-II, producers sold their produce through the co-operative society, which in turn sold the produce to the traders. In this channel only 30 accounting for 23.4 per cent, sold 8115 quintals of copra which was worked out to be 30 per cent of the total produce, through this channel.

The factor influencing prices of copra reveals that variation in prices of copra is explained by two factors namely number of traders and arrivals of copra in market. The production of copra has negligible impact on the price of copra. The problem faced by marketing intermediaries revealed that the taxes levied by central and state government, price fluctuation, high transportation cost, interstate border taxes are found to be the core of the problem.

ECOLOGICAL STUDIES ON VEGETATION CHARACTERISTICS OF GERSOPPA FOREST RANGE

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ABSTRACT

Gersoppa range with varied topographic and edaphic conditions endowed diverse plant resources, gives it a status of high diversity hot spot.

The study area composed of 191 plant species distributed over 58 families. Among the different altitudinal zones, considered in the study area, the third altitudinal zone (250-350 m MSL) was found to be richest in species composition with 142 species followed by second altitudinal zone (150-250 m .MSL) with 128 species, first (50-150 m MSL) and fourth (350-450 m MSL) altitudinal zones with 123 species each.

The flora was dominated by Lauraceae, Rubiaceae. Euphorbiaceae, Fabaceae, Ebenaceae, Myrtaceae and Rutaceae members. The lower altitudinal zone was dominated by *Knema attenuata* - *Vitex altissima* - *Hopea ponga* type of formation. The second altitudinal zone was dominated by *Knema attenuata* - *Olea dioica* - *Polyalthia fragrans* type of formation. The third altitudinal zone was dominated by *Knema attenuata* - *Syzygium gardneri* - *Hopea ponga* type of formation. The fourth altitudinal zone was dominated by *Syzygium gardneri* *Knema attenuata* - *Oimocarpus longana* type of formation. All the altitudinal zones exhibited close relation with each other encompassing more than 64% of common species.

The Shannon's tree species diversity (H') in the study area ranged from 3.645 to 3.877 indicating relatively high species diversity.

The tree density in the study area varied from 280 trees/ha to 410 trees/ha. The tree basal area in the study area ranged from 15.23 m²/ha to 26.42 m²/ha. The important and dominant species recorded in the saplings and poles strata were *Calamus thwaitesii*, *Hopea ponga*, *Aporosa lindleyana*, etc.

The IVI value results reflected *Hopea ponga*, *Knema attenuata* and *Aglaia extipua*, *Oimocarpus longana*, etc., as the most dominantly regenerating species.

The tree basal area, tree density, species richness and diversity exhibited positive correlation with altitude and nitrogen, phosphorus, potassium, organic carbon content of soil while negative correlation with slope gradient.

EFFECT OF COVER CROPS AND HERBICIDES ON WEED CONTROL IN BANANA CV. RAJAPURI (MUSA AAB)

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ABSTRACT

An investigation was conducted at Kittur Rani Channamma College of Horticulture, Arabhavi, University of Agricultural Sciences, Dharwad during the year 1999-2000 to study the effect of cover crops and herbicides on weed control in banana cv. Rajapuri (*Musa AAB*).

Significant difference among the treatments with regard to growth characters like plant height, plant girth, number of leaves, leaf area and leaf area index was observed.

Hand weeding (weed free) treatment recorded lower weed population (0.75) and dry weight of weeds (0.71 g/m^2), whereas cowpea double crop recorded significantly lower weed population and total dry weight of weeds (14.98 and 9.91 g/m^2 , respectively).

With regard to bunch characteristics, viz., bunch length, bunch width and number of hands per bunch, maximum values were obtained in hand weed (weed free) treatment (41.08 cm, 32.44 cm and 9.52, respectively), while minimum values were recorded in the treatment glyphosate 2.0 kg per hectare followed by glyphosate 1.0 kg per hectare (36.83 cm, 28.37 cm and 7.97, respectively). Other characters like bunch weight, number of fingers on third hand and total fingers per bunch were maximum in the treatment cowpea double crop (11.73 kg, 13.38 and 112.94, respectively).

Higher values for all quality parameters were found with weed free treatment (days for ripening (4.01 days), shelf life (7.69 days) and total soluble solids (21.81°Brix) followed by cowpea double crop (3.86 days, 7.05 days and 25.05°Brix , respectively). The highest benefit cost ratio was observed in treatment cowpea double crop (3.07) followed by integrated weed control (2.87).

INTRA-URBAN DIFFERENCES IN THE PREVALENCE OF COMPLICATIONS AMONG THE DIABETICS AND IDENTIFICATION OF RISK FACTORS - A RETROSPECTIVE STUDY

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ABSTRACT

The present research revealed the intra-urban differences in the prevalence of complications among the diabetics and identified the risk factors of the complications. For the prevalence study and documentation of complications, a sample of 3000 was randomly selected from the records of diabetic clinics and hospitals of Hubli-Dharwad. About 200 diabetics, 100 each complicated and uncomplicated were interviewed for food habits and diabetes details using pretested questionnaire. Nutritional status was assessed by, dietary, anthropometric and clinical methods. Out of 3000 diabetics, 35 per cent developed complications. Majority were type-2 diabetics. Diabetics with complication had higher age (60-69 years), longer duration (10-20 years) and early onset (40-50 years).

In type-2, retinopathy (31.76%) and in type-1, hypoglycemia (56.67%) ranked first among complications. In sub-sample (n=200), sedentary lifestyle and positive family history was evident in the complicated group (n=100). All diabetics followed a common meal pattern with dietary modifications considered more by the uncomplicated group. Most of the diabetics exercised. Clinical reports showed abnormal tachycardia and hypertension in diabetics with complication. Majority of the diabetics (n = 100), especially the male suffered from coronary artery disease (55%) followed by retinopathy, nephropathy, neuropathy, gastrointestinal disorders, peripheral vascular disease, infection, cerebrovascular disease and hypoglycemia. Morbidity and age related problems were almost even among the groups.

Poor glycemic control, high triglycerides and total cholesterol levels were observed among diabetics with complication. Obesity was pronounced in the complicated group, with females showing an upperhand. Mean per cent adequacy of energy was high in uncomplicated group. Higher age, longer diabetes duration, early age at onset, higher blood glucose and LDL cholesterol levels, abdominal obesity, low HDL cholesterol, combined dyslipidemia, hypertension, bad vices and sedentary lifestyle were influential factors in complicated group and risk factors for uncomplicated group.

THE CRITICAL ANALYSIS OF IDENTITY STYLE AND ADJUSTMENT OF COLLEGE STUDENTS

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ABSTRACT

This study on the critical analysis of identity style and adjustment of college students, conducted on a sample of 450 college students of arts, science and Commerce faculty (18-23 years) selected from Bungarnagar arts, Science and Commerce degree College, Dandeli, Uttar Kannada taluk of Karnataka state. The results revealed that 96 per cent of the students have developed their unique identity style, among them 80 per cent of the students have developed information identity style. Information identity style was significantly and positively related to social, educational, emotional adjustment and high commitment. 11 per cent of the students had developed normative style which was not related to any aspects of adjustment. 4 per cent of the students had developed diffuse / avoidant style, which was not having any relationship with adjustment. Similarly, 4 per cent of adolescents had developed dual identity style, which was also had no relationship with adjustment. Majority of the female students were satisfied in their home, social and emotional adjustment. But, there was significant difference between male and female students in educational and emotional adjustment. With regard to personal variables there was significant relationship between commitments and percentage of marks, between normative status and family income and also between diffuse / avoidant status and education of father. Correspondingly, there was significant positive relationship between percentage of marks, education of mother, family income and home adjustment. But, significant negative relationship between education of father and home adjustment.

96 per cent of students have developed their identity style. There is no gender difference in identity style. Majority of the students are satisfied in their home, social, educational and emotional adjustment. Gender has no differential effect on educational and emotional adjustment, information style and high commitment status were significantly related to adjustment.