

**Abstract of Theses Accepted for the Award of Post-Graduate Degrees
in the University of Agricultural Sciences, Dharwad**

DOCTOR OF PHILOSOPHY

AGRICULTURAL ECONOMICS

**An Economic Analysis of Investment for Sustainable Use of Ground water in Konkan Region of
Maharashtra State**

J.M. TALATHI

2002

MAJOR ADVISOR : Dr. G.K. HIREMATH

The Creamy section of rural society with better access to institutional finance and large size of holding are able to invest on ground water development. An attempt has been made for assessment of financial feasibility and resource use efficiency under ground water use. A multi-stage sampling technique was followed to draw a sample of 180 farmers from three taluks of Thane district. The Data pertained to the agricultural year 1996-97.

The returns per hectare were Rs. 98,492 in traditional method of irrigation (TMI) and Rs. 1,21,596 in modern method of irrigation (MMI) with per hectare employment of 393 and 311 mandays in TMI and MMI. The cost of irrigation per one lakh litres of water was Rs. 592.32, Rs. 219.73 and Rs. 353.46 in TMI and Rs. 701.56, Rs. 456.47 and Rs. 579.03 in MMI in dug well (DW), bore well (BW) and dug cum bore well (DCBW) respectively. The NPV, BCR and IRR were fairly higher in MMI over TMI. The internal rate of return (IRR) ranged from 87.38 per cent to 357.57 per cent across different well irrigation

structures, due to high profitability in vegetable and fruit production. The pay back period for well investment was 2 years.

The saving in input use in MMI was observed for human labour (27%), bullock labour (34%), fertilizer (5%) and plant protection chemicals (16%). The actual quantity of water saved in MMI was to the extent of 54 per cent thereby reducing irrigation expenses by 81 percent. The extent of ground water exploitation to the well yield in different well types was 44 to 76 per cent in farms with TMI and 54 to 65 per cent in farmer with MMI.

Lack of adequate knowledge about modern method of irrigation (85%), poor quality of irrigation equipment (72%), poor knowledge about precise water requirement of crop (63%) were the major constraints reported in irrigated farming. This study indicated advantage of saving in factors of production.

MASTER OF SCIENCES

AGRONOMY

Studies of Crop-Weed Interference with Dominant Weed Flora in Upland Rice

L.GEETHA

2002

MAJOR ADVISOR: Dr. V.V. ANGADI

A field experiment was conducted at the Agricultural Research station, Mugad during the kharif season of 1999 to study the effect of weeds on growth and yield of rice and nutrient uptake pattern under upland drill sown conditions.

There were sixteen treatment combinations, which included major four weeds *Echinochloa spp.*, *Cyperus spp.*, *Alternanthera sessilis* and *Cyanotis spp.* in two, three and four weed combinations with weedy check and weeded check. The experiment was laid out in randomised block design.

The results revealed that weed competition was greater during 30 to 60 DAS Grain yield was highest in weeded check 46 q ha⁻¹ and unweeded check reduced the yield by 64 per cent (16.5 q ha⁻¹). The maximum grain yield was reduced by *Echinochloa spp.* 50 percent followed by *Cyperus spp.* 41 per cent, *Alternanthera sessilis* 23 per cent and *Cyanotis spp.* The presence of two weed species i.e. *Echinochloa spp.* + *Cyperus spp.* reduced the rice grain yield by 41 per cent compared to other combinations.

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Nutrient uptake by crop was maximum in weeded check followed by treatment with *Cyanotis* spp. The nutrient uptake by weed was higher in *Echinochloa* spp. 11, 22 and 19.5 per cent N, P and K and *Cyperus* spp. 8, 11 and 15.5 per cent N, P and K respectively. In combinations *Echinochloa* spp. + *Cyperus* spp. removed nitrogen to the extent of 15 per cent, *Echinochloa* spp. + *Cyperus* spp. + *Alternanthera* spp. to the extent of 22 per cent. Grain yield

of rice was negatively correlated with the nutrient uptake by weeds.

The results clearly indicated that the maximum yield of rice was reduced with *Echinochloa* spp. (64%) *Cyperus* spp. (41%) in upland rice system and maximum nutrient uptake with *Cyanotis* spp., *Echinochloa* spp. + *Cyperus* spp. + *Alternanthera* spp., removed the nitrogen to the extent of 22 per cent.

Response of Wheat (*Triticum aestivum* L.) to Organics, Macro and Micronutrients Under Irrigation

K.CHANDRAKUMAR

2002

MAJOR ADVISOR: Dr. A.S. HALEPYATI

A field experiment was conducted at the Agricultural College Farm, Raichur during rabi of 2001-2002 to know the response of wheat (*Triticum aestivum* L.) to organics, macro and micronutrients under irrigation. There were 28 treatments comprising combinations of four organic manure treatments and seven micronutrients and methods of application. The experiment was laid out in a split plot design with three replications.

Application of RDF+ FYM @ 10 t ha⁻¹ recorded significantly higher grain (34.94 ha⁻¹) and straw yield (54.98 q ha⁻¹) and it was on par with RDF+ poultry manure (PM) @ 1 t ha⁻¹. The higher grain and straw yield of wheat with the application of organic manures along with RDF was attributed to significantly higher growth and yield components (ear length, ear weight and 1000-grain weight etc.).

Soil application of ZnSO₄ @ 10 kg ha⁻¹ recorded significantly higher grain yield (30.19 q ha⁻¹) when

compared to rest of the micronutrient treatments and it was attributed to significantly higher growth (dry matter production, LAI and LAD) and yield components (ear length, grain, weight, number of grains and 1000-grain weight).

With regard to interaction effects, RDF+FYM @ 10 ha⁻¹ + soil application of ZnSO₄ @ 10 ha⁻¹ and RDF+PM @ 1 t ha⁻¹ + Soil application of ZnSO₄ @ 10 kg ha⁻¹ recorded significantly higher grain (38.65 q ha⁻¹) and straw yield (57.28 q/ha⁻¹), respectively.

Application of RDF+FYM @ 10 t ha⁻¹ + soil application of ZnSO₄ @ 10 kg ha⁻¹ recorded maximum cost of cultivation (Rs. 11,847 ha⁻¹) and gross returns (Rs. 35,921 ha⁻¹) but, significantly higher net returns (Rs. 24,108 ha⁻¹) and B:C(2.36) was with RDF + PM @ 1 t ha⁻¹ + soil application of ZnSO₄ @ 10 kg ha⁻¹.

CROP PHYSIOLOGY

Effect of Bhumilabh on Growth, Development and Physiological Aspects in Sugarcane (*Saccharum officinarum* L.)

BASAVARAJA C. GALAGALI

2002

MAJOR ADVISOR: Dr. M.B. CHETTI

A field experiment was conducted at the Karnataka Institute of Applied Agriculture Research (KIAAR) of Godavari Sugar Mills Ltd., Sameerwadi Dt. Bagalkot during 2000-01 to study the effect of Bhumilabh on growth, development and physiological aspects in sugarcane. The experiment consisted of nine treatments laid out in randomized block design with three replications. Results revealed that the treatments differed significantly with respect to germination per cent, yield and yield components. The treatment T₄ (30 t/ha of Bhumilabh)

recorded the maximum germination per cent, more number of tillers per clump, maximum stalk diameter at harvest. The same treatment also recorded highest plant height and maximum internodes per stalk and number of green leaves.

The results of various growth parameters indicated that LAI, LAD, BMD, AGR and CGR were positively and LAR was negatively correlated with cane yield. However, RGR and NAR were inconsistent with stages

and treatments. The treatment T_4 had better LAD at all the stages and this treatment also yielded high. The total chlorophyll content was maximum at 150 DAP and it was high in treatment T_7 (25 t/ha of enriched Bhumilabh). Significant differences were observed among the treatments for cane yield. The treatment T_4 (151.35 t/ha) followed by the treatments T_6 (T_6 = 50 t/ha of Bhumilabh) and T_7 had the maximum cane yield. Brix, sucrose,

commercial cane sugar (CCS) and purity per cent differed significantly with treatments. The treatment T_7 recorded highest brix and sucrose whereas, T_4 recorded the highest commercial cane sugar. Thus, it is concluded from the results that the Bhumilabh @ 30 t/ha had better effect in sugarcane for getting higher cane yield. Whereas, application @ 25 t/ha of enriched Bhumilabh had better effect for improving quality.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

Long Term Effect of Integrated Nutrient Management in Sorghum Based Cropping Systems on Physico-Chemical Properties of Vertisol

V.D. KULKARNI

2002

MAJOR ADVISOR: Dr. G.N. DANDAGI

A long term Sorghum based cropping system field experiment was initiated during, Kharif and rabi seasons of 1991-92 by the All India Co-ordinated Research Project on Sorghum at Main Research Station, in vertisol at Agriculture College farm, Dharwad. The same experiment has been continued till to date and 1999-2000 on fixed site to study the long term effect of it Sorghum based cropping system on soil properties. The field experiment was laid out the field experiment was laid out in a two factorial RBD with 20 treatments (4 cropping systems X 5 combinations of organic and inorganic sources of nutrients) with three replications. The treatments were randomized in the replications. Soil bulk density and porosity was not influenced significantly by cropping systems and fertilizer treatments. However infiltration rate, maximum water holding capacity and per cent aggregates were stability influenced significantly by both cropping systems and fertilizer treatments. However infiltration rate was observed in potato - sorghum cropping system and

incorporation of crop residue. Maximum water holding capacity and per cent aggregates stability were highest in groundnut - sorghum cropping system and in FYM +50% RDF fertilizer treatment. Soil pH and EC were not influenced significantly by cropping systems and integrated nutrient management had significant influence on soil pH. Organic carbon was highest with groundnut sorghum cropping system and with FYM +50% RDF fertilizer treatment. The available nitrogen was highest with sorghum-safflower-cropping system and with FYM+50% RDF fertilizer treatment. The available phosphorus and potassium were highest with sorghum (fodder)+cowpea (fodder) - ratoon sorghum cropping system and in FYM+50% RDF fertilizer treatment. The same trend was observed with uptake of nitrogen, phosphorus and potassium. The dehydrogenase activity was highest in groundnut-sorghum cropping system and in FYM +50% RDF fertilizer treatment. The grain yield was highest in groundnut-sorghum cropping system and in FYM +50% RDF fertilizer treatment.

AGRICULTURAL ENTOMOLOGY

Species Complex and Population Dynamics of Fruit Flies (Diptera: Tephritidae) on Some Fruit and Vegetable Crops

KAMINENI SURESH BABU

2002

MAJOR ADVISOR: Dr. SHASHIDHAR VIRAKTAMATH

Investigations on the diversity and monitoring of fruit flies by using methyl eugenol traps were carried out at the University of Agricultural Sciences, Dharwad, Kumbapur, Morigere, Ranebennur and Hulkoti from January 2001 to May 2002 in different crop ecosystems.

Four species of fruit flies namely *Bactrocera zonata*, *B. correcta*, *B. dorsalis* and *B. cucurbitae* were trapped in mango, guava and cucurbits. In ber, besides these species, *B. nigrotibialis* was trapped and *C.*

vesuviana was recorded from the infested fruits. *B. dorsalis* was the most dominant species. In mango orchards, *B. dorsalis* had three peaks at Dharwad (21st, 23rd and 46th standard weeks), two peaks at Kumbapur (22nd and 47th standard weeks) and one peak at Hulkoti (20th standard week). In guava, *B. dorsalis* had one peak (45th standard week) at Dharwad and three peaks (43rd, 45th and 47th standard weeks) at Kumbapur. In ber, *B. dorsalis* had one peak at Morigere (50th standard week).

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In cucurbits, *B. dorsalis* and *B. cucurbitae* reached a peak during 44th standard week at Ranebennur.

Maximum larvae of 0.75 per fruit and fruit infestation of 30.0 per cent was recorded in mango. Similarly in guava and ber 0.70 and 0.52 larvae fruit and fruit infestation of 46 and 34 per cent were observed, respectively. There was significant positive correlation between fruit infestation and trap catch.

In mango, *B. zonata* and *B. correcta* had significant positive correlation with minimum temperature

at Dharwad, while at Kumbapur, both the species had positive correlation with maximum temperature and minimum temperature. *B. dorsalis* and *B. cucurbitae* had no relationship with all the weather parameters.

In guava *B. zonata* and *B. correcta* had highly-significant positive correlation with maximum temperature and highly significant negative correlation with morning relative humidity at Dharwad. At Kumbapur both the species had positive correlation with maximum temperature and afternoon relative humidity.

SERICULTURE

Intercropping of Chilli Varieties in Paired Row Planted V₁ Mulberry and its Impact on Silkworm *Bombyx mori* L.

SANTOSH SAWALGI

2002

MAJOR ADVISOR: Dr. G.M. PATIL

A field experiment was conducted during July-November, 2001 to study the effect of intercropping chilli varieties in paired row system of V₁ mulberry in transitional tract of north Karnataka at Main Research Station, Dharwad. The experiment consisted of seven treatment combinations laid out in a randomized block design with four replications.

Among the different treatment combination sole mulberry recorded significantly higher number of erect branches/plant (7.50), number of bent branches/plant (7.10), number of leaves/plant (170), leaf area (213.53 CM²), leaf area index (7.89), leaf yield (312.50 g/plant, 16.80 t/ha/crop and 84.09 t/ha/year 5 crops). Among the different chilli varieties intercropped with mulberry, the Byadgi dabbi chilli recorded significantly higher plant height (79.95 cm), number of branches (5.30), number of leaves (188.5), green fruit yield (130 fruits/plant 265 g/plant and 81.77 q/ha) was recorded in Byadgi dabbi chilli variety

over rest of the varieties whereas, lowest was noticed in Kadroli local.

Performance of silkworm (PM X NB₄D₂) on V₁ mulberry + chilli intercropping system showed nonsignificant difference with respect to larval weight, larval duration and ERR. Similarly, cocoon and grainage parameters were found to be nonsignificant. Further, the incidence of flacherie, grasserie and muscardine in all the instar worms fed with sole mulberry was numerically less compared to other chilli intercropped mulberry treatments.

Mulberry + Byadgi dabbi recorded highest gross returns (Rs.67,225/ha), net returns (Rs.51,532/ha) and B:C ratio (4.28) compared to sole crop of mulberry and other chilli intercropped mulberry treatment. Among the different chilli varieties growing of Byadgi dabbi as an intercrop with V₁ mulberry has recorded maximum yield and net returns compared to sole crop of mulberry or mulberry intercropped with other chilli varieties.

PLANT PATHOLOGY

Studies on Variability In *Sclerotium rolfsii* Sacc. Causing Stemrot of Groundnut

P.PALAI AH

2002

MAJOR ADVISOR :Dr. S.S. ADIVER

Groundnut (*Arachis hypogaea* L.) is an important oil seed crop and cultivated in tropical and sub tropical regions of the world. Stemrot of groundnut caused by *Sclerotium rolfsii* is major constraint in groundnut production system in Karnataka and elsewhere.

The studies on variability in the causal organism was undertaken. The isolates of *S. rolfsii* obtained from twelve different locations of Karnataka showed marked differences in their growth rate on both solid and liquid media and time for sclerotial initiation. The isolates were

also different with regard to their colour, size, number and weight of the sclerotial body.

The isolates exhibited marked variation with respect to utilizations of various nutrient substances. Badami (Sr BAD) isolate produced maximum dry mycelial weight and least was recorded by Koppal (SrKOP) isolate in the media tested. As regard to time taken for sclerotial initiation, the isolates collected from Koppal (SrKOP) and Ramdurga (SrRAM) location took maximum time (10 days) and minimum was (6 days) in Kunimehalli (SrKUN) isolate. The isolate of Badami (Sr BAD) exhibited maximum growth at 30 °C and pH 6.0 compared to other.

The studies on pathogenic variation of isolates on groundnut variety (TMV-2) revealed that isolates collected from Hanumanamatti was highly virulent and caused maximum damage to the seedlings and Hiriur (SrHIR) isolate expressed mild pathogenicity. Cross inoculation studies involving six host crops (tomato, soybean, sunflower, wheat, bengalgram and groundnut)

isolates of *S. roffii* revealed that, the groundnut isolate was found highly virulent on all the five hosts inoculated and wheat isolate was less virulent. The study also showed that, bengalgram seedlings were highly susceptible to these isolates.

The isolates of groundnut also varied with respect to production of oxalic acid in culture medium. The Bijapur (SrBIJ) and Hanumanamatti (Sr.HAN) isolates produced higher amount of oxalic acid and least production was observed in isolate collected from Hiriur (Sr.HIR) and this was correlated with the pathogenicity of the isolates on groundnut.

Investigations on sensitivity of isolates to agrochemicals revealed that, chlorpyrifos significantly affected the growth of all isolates followed by pendimethalin. Among the isolates Raichur (SrRAI) and Kunimehalli (SrKUN) isolates showed greater sensitivity to agrochemicals and isolate Bijapur (Sr BIJ) was least sensitive. The isolate exhibited greater differential sensitivity of growth to *Gliocladium virens* compared to other bioagents tested.

Studies on *colletotrichum gloeosporioides* (Penz.) and Sacc., *Botryodiplodia theobromae* Pat. and *Fusarium semitectum* Berk. and Rav. Causing Fruit Rot of Custard Apple (*Annona squamosa* L.)

SOMNATH V. BIRADAR

2002

MAJOR ADVISOR: Dr. M.S. KULKARNI

Custard apple being important tropical fruit crop is being affected by several diseases among which fruit rot caused by *Botryodiplodia theobromae* Pat. *Colletotrichum gloeosporioides* and *Fusarium semitectum* is important. Studies on *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc., *Botryodiplodia theobromae* Pat. and *Fusarium semitectum* Berk. and Rav. causing fruit rot of custard apple includes isolation, identification, and proving pathogenicity test. Cultural, physiological and nutritional characters of pathogens, host range studies and bioassay of fungicides. *B. theobromae* produces two types of conidia first coloured and septate conidia (13.5 x 24 µm) and the second hyaline and non septate conidia (12.5 x 23.0 µm). In *C.gloeosporioides* conidia are cylindrical, hyaline and non septate (9.27 x 3.83 µm) while, *Fsemitectum* produces both macroconidia (31 x 3.37 µm) and microconidia (5.9 x 3 µm). Among solid media tested, potato dextrose agar supported maximum growth (90.00 mm) in all the fungi under study followed by oat meal agar.

In growth phase study maximum growth was obtained on 12th day of incubation in *C.gloeosporioides* (311.66 mg) and on 10th day in *F.semitectum* (237.00 mg) and *B.theobromae* (261.33 mg). In liquid media studies, maximum growth occurred in Richards's broth in case of *C.gloeosporioides* (376.00 mg) and *F.semitectum* (296.00) while potato dextrose broth was found best to *B.theobromae* (254.50 mg). Among carbon and nitrogen sources tested sucrose and potassium nitrate supported maximum growth respectively in all the fungi under study. In temperature studies maximum growth occurred at 25°C, 30 °C and 35 °C in case of *B.theobromae* (180.00 mg), *C.gloeosporioides* (295.00 mg) and *F.semitectum* (301.33 mg, respectively). The pH 6 supported maximum growth to all the fungi under study. All the fungi under study infected all nine different fruits under host range studies. In in vitro evaluation of fungicides carbendazim and captan was found to be best in inhibiting the growth of all the fungi under study.

Abstract of Theses

Studies on Integrated Management of Charcoal Rot of Maize (*Zea mays* L.) Caused by *Macrophomina phaseolina* (Tassi.) Gold. with Special Reference to Biological Control

M. JOHN SUDHAKAR

2002

MAJOR ADVISOR: Dr. M.R.KACHAPUR

Maize charcoal rot caused by *Macrophomina phaseolina* (Tassi.) Gold is important since it plays major role in the loss of yield. Different aspects of charcoal rot management were carried out in the present investigation.

Macrophomina phaseolina was isolated from infected maize stalk. The fungus attained maximum growth on 12th day of incubation. *Aspergillus* spp., *Trichoderma harzianum*, *Pseudomonas* spp., *Bacillus* spp. were isolated from maize rhizosphere soil. *T. Viride* (1), *T. koningii* and *T. harzianum* (1) were effective in inhibiting the growth of *M. phaseolina* in dual culture. *Bacillus* spp., *Pseudomonas* spp., were effective against *M. phaseolina* by producing non-volatile antibiotics. *T. viride* (1) *T. Koningii* and *T. harzianum* (1) were effective against *M. phaseolina* by producing volatile antibiotics. Captan, 2-D endosulfan and captan +carbofuran were found compatible with *T. viride* and *T. harzianum*. Garlic clove extract was found

effective in inhibiting growth of *M. phaseolina* *in vitro* at all the concentrations evaluated. Hexaconazole, SAAF and triadimefom were found very effective against *M. phaseolina* at all three concentrations evaluated. Farm yard manure, biogas slurry and wheat straw were found effective as substrates against *T. viride* (1).

Out of twenty nine genotypes screened, only eight were susceptible, remaining all showed moderately resistant reaction. DMH-2 recorded lowest grade of charcoal rot. Management studies in both pot culture and field revealed that, no considerable decrease in bioagent population upto 90 days after augmentation, but later on decrease was observed. Moderately resistant genotype, farm yard manure application along with *T. viride* (1) as seed treatment and also as soil application, were found effective in reducing charcoal rot parameters as well as increasing yield parameters.

Studies on Foliar Blight Pathogens of Wheat with Special Reference to *Helminthosporium sativum* Pammel, King and Bakke

KISHORE VARMA PENUMATSA

2002

MAJOR ADVISOR: Dr. YASHODA R. HEDGE

Foliar blight of wheat is considered as a complex disease because of number of pathogens associated causing blight, blotch and spots in India. Isolations from blight infected wheat leaves collected from Kanpur, New Delhi, Uttaranchal, Ludhiana and Karnataka revealed *Helminthosporium sativum* as the major pathogen associated with foliar blights of wheat and all isolates were proved to be pathogenic. *Alternaria alternata* was isolated from four states viz., Karnataka, Punjab, Uttar Pradesh and Uttaranchal and was proved to be pathogenic.

Ten hyphal tip isolates of *H. sativum* were tested for their cultural and morphological variability. Isolates varied among themselves with regard to type of margin, colour, colony characters and also sporulation. The shape of the colony of isolates varied from irregular with aerial mycelium to circular with abundant aerial mycelium. The colony colour of different isolates varied from blackish with whitish margin to light greenish with whitish margin.

The isolates varied with respect to size of conidia and number of pseudosepta. The size of conidia varied from 13.7-89 μ m x 10-29.3 μ m and the number of

pseudosepta varied from 2-9. In case of *A. alternata* isolates conidial size varied from 13.5-37.5 μ m x 6.5-14 μ m.

Among different substrates evaluated for mass multiplication of *H. sativum*, sorghum seeds and sorghum dry matter supported the maximum sporulation of the test fungus. *In vitro* studies revealed that chemicals like propiconazole (0.1%) and mancozeb (0.3%) were effective against the pathogen. Among plant extracts assayed *in vitro*, *Duranta repens* (5%) and *Azadirachta indica* (10%) were effective against the pathogen. Among biocontrol agents evaluated, *Trichoderma harzianum*, *T. koningii*, *T. viride*, *Bacillus subtilis* and *Pseudomonas fluorescens* were found to be antagonistic to *H. sativum*.

Under field conditions, best control of the disease with higher grain yield and Benefit:Cost ratio was obtained in propiconazole (0.1%), carboxin ST + econeem and *T. viride* + econeem. Out of 32 rust resistant varieties screened for foliar blight resistance, 31 genotypes showed resistant reaction and one genotype viz., HD-8627 showed moderately resistant reaction.

Perpetuation, Physiologic Specialization and Management of Stem and Leaf Rusts of Wheat

MOHAMMED KIYAR

2002

MAJOR ADVISOR: Dr. SRIKANT KULKARNI

Black stem and leaf rusts of wheat caused by *P. graminis* var. *tritici* and *P. recondita* f.sp. *tritici*, respectively are the notorious wheat pathogens, which are the major constraints in wheat production. Experiment were carried out to know the survival period of the uredospores at different incubation conditions, the existence of races in some locality of Karnataka and management of these rusts.

The survival period of uredospores of black stem and leaf rusts were more in deep freezer (90days) and refrigerator (75 days), but their survival period in glass house and room temperature was very short i.e., 15 days each.

The study on the physiologic races existing in Dharwad and Belgaum districts revealed that, race group 15C (63G31) and 21A1 (20G21) of black stem and race

77-5 (121R63-1) and 104-2 (21R55) of leaf rust were predominant.

Out of 22 commercially grown varieties tested, DDK1001, L.Khapli and NIAW 15 showed terminal severity of 5R, 5R, 5R for stem rust and 5MR, 5MS, 5MR for leaf rust, respectively. Whereas, DWR162 showed the terminal severity of 80S for both stem and leaf rusts.

The postulation of Sr and Lr genes on eight commercially grown varieties of wheat revealed that, DWR 2006 and DDK1001 carry Sr 9e and varieties viz., NP200, DDK1009, DDK1019 and DDK1020 were found to carry Sr7b with an additional unknown gene. These eight varieties were found to carry Lr genes viz., Lr26, Lr13, Lr23 and Lr10 as singly or in combination except varieties viz., DWR1006, NP200 and DDK1009 which could not be postulated.

AGRICULTURAL ECONOMICS

Risk Minimizing Crop Production Strategy for Northern Dry Zone of Karnataka

AMINA MAHARJAN

2002

MAJOR ADVISOR: Dr. G.K. HIREMATH

Risk and uncertainties play a vital role in agriculture. The present study was undertaken in Northern Dry Zone of Karnataka, with the objective of studying the growth and instability in yield of major crops, ascertaining the probability of success of major crops by working out the breakeven level of yield, measuring the risk involved in various crops and suggesting appropriate crop plant for the zone.

The ideal condition of high growth in yield with growth of more than 1.93 per cent and low inter-yield instability with CV less than 30 per cent were found to exist in wheat, groundnut and sunflower in Belgaum; rice, jowar, bajra, groundnut and sugarcane in Bijapur, wheat, bajra and groundnut in Dharwad and cotton crop in Raichur district.

The probability of success was highest (one) in the crops viz HYV paddy, hybrid maize, sunflower (irrigated) and rainfed cotton in kharif season; hybrid wheat and bengalgram in rabi season and HYV paddy and

groundnut in the summer season and the annual crop sugarcane.

Consideration both risk and average net returns, the crop with low level of risk (CV less than 45%) and high average net returns (more than Rs. 1000/ha) were HYV paddy, hybrid maize and sunflower during kharif season; hybrid wheat during rabi season; HYV paddy in summer and annual crop sugarcane (planted).

Employing the MOTAD programming, four different optimum crop plans with varying level of net return and associated risk was determined. The net farm income realized from existing crop plan was Rs. 996.84 crores. The net returns increased from Rs. 1006.02 crores in Model I to Rs. 1437.18 crores in Model IV and the CV increased from 0.09 per cent to 27 per cent, respectively. This clearly indicated the fact that with increase in returns the risk also increased. The result also indicated that the existing crop plan is sub-optimal and there is scope to increase net returns by changing the crop combination.

AGRICULTURAL ECONOMICS

Growth and Instability of Cotton Production in Karnataka

GRIMA ABOMA

2002

MAJOR ADVISOR: Dr. S.M. MUNDINAMANI

This study was taken up to (1) estimate growth rates in area, production and productivity of cotton in major cotton growing districts and the state as a whole (2) analyze the extent of instability in cotton production, (3) identify price and non-price variables responsible for instability in cotton acreage and (4) suggest appropriate measures to stabilize cotton production in the state. The data were collected from the Directorate of Economics and Statistics, Bangalore, for the period 1970-71 to 1998-99. Compound Growth Rate, Orthogonal Polynomial Regression Analysis, Sharma Output Decomposition, Coefficient of Variation, Hazel Decomposition Model, Factor Analysis and Nerlovian Price Expectation-Cum-Area Adjustment Model were among the analytical techniques employed for analysis.

Growth performance of cotton production in Karnataka was more pronounced (2.9% in period I, 4.55% in period II) during period II due to significant growth in both area and productivity, while in period I yield was the sole contributor. Production instability increased in the second period because of area variance (48.03%), yield variance (22.64%), interaction between changes in mean yield and area variance (21.2%) and change in mean yield (1.8%). Acreage response analysis indicated that cotton area was elastic with respect to lagged relative price, expected yield, lagged acreage and the time variables.

This study suggested the need for area and yield stabilization policies to stabilize cotton production in the state. Assuring appropriate support prices could also minimize price risk in cotton cultivation.

HORTICULTURE

Genetic Variability Studies in Bitter Gourd (*Momordica charantia* L.)

M. SANGEETA KUTTY

2002

MAJOR ADVISOR: Dr. P.R. DHARMATTI

Bitter gourd is an important cucurbitaceous vegetable with good nutritive value and medicinal importance. The present study was undertaken to elicit information on the nature of variability in bitter gourd genotypes, correlation and path analysis studies of component characters with yield and to screen the genotypes against major pest and disease.

The analysis of variance revealed significant differences among genotypes for all characters studied except days to opening of first female flower and days to first harvest. The phenotypic coefficient of variability was more than genotypic coefficient of variability for all characters under study.

Most of the important characters showed high genetic advance over mean with high heritability, indicating the influence of additive gene action for these traits, which could be improved by simple selection procedure.

Correlation studies revealed that yield per plant was positively and highly significantly correlated with number of leaves at 50 per cent flowering, number of

seeds per fruit, fruit length, number of fruit per plant and fruit weight both at phenotypic and genotypic level. Hence selection for these traits may help in improvement of yield. The path coefficient analysis for yield indicated that number of fruits per plant and fruit weight were the most important factors influencing the yield, thereby deserving greater weightage during selection for yield.

The 40 bitter gourd genotypes were grouped into 10 clusters based on D2 values. The clusters VI and IX were most divergent, thus the genotypes of these clusters could be used in hybridization programme to get higher heterotic hybrids.

From the study high yielding genotypes such as BLG-1, PRD-2, NRN-1, IC44418, DWD-2, IC32817, IC85614, IC68316, promising line with respect to resistance to fruit fly (BLG-1, IC44418, IC32817, IC8514), and downy mildew resistant genotypes viz. White long and BLG-1 could be screened. These genotype can be further utilized as such or in hybrid combinations. The genotype BLG-1 was most promising with respect to yield and resistance to pest and disease.

VETERINARY MICRO BIOLOGY

Effect of Calf Thymus Extract on Immunity In Chicken Vaccinated with Newcastle Disease Virus

B.M. CHANDRA NAIK

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MAJOR ADVISOR: Dr. Y. HARI BABU

A total of 40, days-old layer chicks (BV-300) were divided into test group (25 chicks) and control group (15 chicks). Both the groups were vaccinated with 'F' strain of New castle disease virus (NDV) on seventh day by intraocular, intranasal route and with R2 B strain of NDV in eight week by subcutaneous route.

In test group, calf thymus extract (CTE) was administered @ 1.8 mg/chick/day by intraperitoneal route one week prior and one week after each vaccination where as the control group remained as just vaccinated birds without CTE administration. Blood samples were collected from the birds after 15 day of each vaccination.

The result of haemagglutination inhibition (HI) test showed higher titres (2.935 ± 0.39) in test group in comparison to control group (2.053 ± 0.08). The test group showed significantly higher total proteins (5.85 g %) and globulins (4.22 g %) in the serum compared to control group (3.18 & 1.95 g % respectively). On application of

Dinitrochlorobenzene (DNCB) the test group revealed and intense cellular reaction compared to control group.

The result of phagocytic index (PI) which was assessed by Nitroblue tetrazolium (NBT) reduction assay revealed a higher nonspecific immune response to NDV vaccination in calf thymus administered chicks than in control birds. The blood showed a significant enhancement in the number of total leukocytes, 37.3 ± 8.4 million/cu mm in test group, where as it was 2.56 million/cu mm in control birds. There was an increase in percent lymphocytes in test group (65%) compared to control group (58.4%)

The overall result indicated that chicken administered with CTE showed higher protective levels of humoral, cell mediated and nonspecific immune response. The result thus advocated that CTE may be used as immunomodulator for enhancing the immunity chicken vaccinated with NDV.

