

Genetics of Yield Contributing Characters in Tetraploid Wheat

G. B. DESHPANDE

1997

MAJOR ADVISOR : Dr. R. R. HANCHINAL

A study was undertaken during *rabi* 1995-96 at Dr. Sanjaya Rajaram Wheat Laboratory, U. A. S. Dharwad. The base material for present investigation included a set of five crosses namely, Bijaga yellow x HD-4502, DDJ-1001 x Bijaga yellow, Raj-1555 x Sham-1, Altar-84 x Sham-1 and Celta x Sham-1, selected from a 9 x 9 diallel. Parents F_1 s, F_2 s and F_3 s of each of the crosses were grown in a randomised complete block design with two replications.

The characters, number of tillers per plant, total biomass per plant, grain yield per plant and harvest index showed high genetic variability in all the five crosses in both F_2 and F_3 generations. The broad sense heritability estimates were high for all characters except for harvest index in Bijaga yellow X HD-4502. The genetic advance as per cent over mean was high for plant height, tillers per plant, grain yield and harvest index in both F_2 and F_3 generations in all the crosses.

All the five crosses exhibited significant heterosis over mid-parent and over better parent for grain yield. The heterosis for number of tillers per plant and total biomass per plant contributed considerably to yield heterosis. The cross DDK-1001 x Bijaga yellow for number of tillers per plant and total biomass per plant; Altar-84 x Sham-1 and Celta x Sham-1 for grain yield showed low inbreeding depression from F_1 to F_2 . The inbreeding depression from F_1 to F_3 was negligible and in most of the cross negative.

The genetic systems operating in the five crosses were different. Bijaga yellow x HD-4502 and DDK-1001 x Bijaga yellow crosses showed predominance of additive gene action, Raj-1555 x Sham-1 showed importance of both additive and non-additive gene action whereas, Altar-84 x Sham-1 and Celta x Sham-1 revealed preponderance of additive and dominance gene action.

Studies on Callus Induction, Morphogenesis and Micropropagation in Indica Rice (*Oryza sativa* L.)

GIRIMALLESHWAR M. GANIGI

1997

MAJOR ADVISOR : Dr. M. S. KURUVINASHETTI

Investigations were conducted to standardize the protocols for the induction and maintenance of callus and regeneration of plantlets in four genotypes of indica rice (Jaya, Intan, Abhilash and Amrut) and clonal propagation in hybrid rice (KRH-1).

Callus was induced on Murashige and Skoog's (MS) medium supplemented with different levels (1, 2, 5 and 5 mg l⁻¹) of 2, 4-D alone or in combination with BA (0.25 mg l⁻¹) from mature embryo and immature inflorescence. The frequency of callus induction from mature embryos was higher (78.86%) than from immature florescence segments. However, the immature florescence derived callus was more whitish in colour than the mature embryo derived callus.

Use of cytokinins (BA) along with 2, 4-D increased the callus induction frequency at an average of 10 percent. The overall frequency of callus induction was maximum (83.24% with 2.5 mg l⁻¹ 2, 4-D plus 0.25 mg l⁻¹ BA). Significant

genotypic differences were observed for callus induction in genotypes used. Amrut gave the best response followed by Intan, Abhilash and Jaya. The rooting in callus was higher in case of Jaya than the other genotypes and the occurrence of green spots was very common in callus cultures of Jaya and Abhilash.

Maintenance of callus was done on MS medium supplemented with 1 or 2 mg l⁻¹ 2,4-D and 0.25 mg l⁻¹ BA. Regeneration of plantlets from established callus was achieved on both BA and hormone free medium. However, addition of BA, increased the regeneration frequency. The regeneration was best in the callus derived from immature florescences (32.07%). For plant regeneration also genotypic differences were observed. The regeneration frequency in Intan (33.19%) and Jaya (32.48%) was better than that of Abhilash (25.69%) or Amrut (23.68%). The regenerated plantlets were normal with many roots. The frequency of rooting and the number of roots produced were better on hormone free medium.

Multiple shoot formation from shoot primordia was done using different BA levels (1, 2, 5, 10 and 15 mg/l) in KRH-1. The highest multiplication rate (20x) was obtained using 2 mg/l BA. The rate of multiplication was the best during second transfer and it stabilized by the third transfer. The clumps (3-4 shoots) rooted easily on the basal MS medium.

Though genotypic effects were significant callus induction and plant regeneration was possible in all the four genotypes. The genotype of the donor plant followed by the explant tissue was the most important factor in the formation of desired type of callus and plant regeneration.

Variability and Correlation Studies in Segregating Generations Derived from Hybridization and Combination of Hybridization and Irradiation in Safflower (*Carthamus tinctorius* L.)

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1997

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An investigation was carried out to determine the extent of variability created by r-ray irradiation of F_0 seeds of safflower crosses, in selfing generation of F_2M_2 and F_3M_3 over their respective selfing series. It was observed that combination but in lower magnitude, compared to hybridization alone for the characters studied.

The change of mean and variances between the irradiated (F_2M_2 and F_3M_3) and control (F_2 and F_3) were of considerable magnitude and in desirable direction for oil content and other yield traits such as capitula number, capitula weight, capitula size and 100 seed weight. It was interesting to note that heritability estimate of certain characters increased in the irradiated populations, thereby increasing the scope of selection by the plant breeder.

The negative relationships occurring between closely linked yield traits were unchanged in selfing series. However, combination of irradiation with hybridization has brought about desirable changes in the F_3M_3 generations by allowing rare recombination to occur between such traits. The important

shifts in correlations were noticed in respect of seed number and seed weight; capitula number and capitula weight; seed number and capitula number, thus increasing the scope of improvement of these characters for obtaining higher seed yield and oil content.

The change in contribution of several yield traits towards seed yield in F_3M_3 both directly and indirectly has also been noticed. The important shifts in direct and indirect effects were observed in respect of number of capitula, capitula weight, seed number, seed weight and hull content in one or the other crosses.

An evaluation of progenies descending from hybridization as well as irradiation and hybridization with parents and best check led to the identification of high yielding lines like 92-3A-30, 92-3A-35, 92-3A-71, 92-2A-3 etc. These progenies could be evaluated further in large scale trials to isolate the superior high yielding and high oil line over A-1 national check.

Genetic Potential of Interspecific Derivatives as Donors for Resistance to some Biotic and Abiotic Stresses in Groundnut (*Arachis hypogaea* L.)

SHREESHAIL B. DIDDIMANI

1996

MAJOR ADVISOR Dr. M. V. C. GOWDA

An investigation was carried out to assess the genetic potential of interspecific derivatives as donors for resistance to foliar diseases (early and leafspots and rust),

Spodoptera litura, *Sclerotium rolfsii* besides dormancy in groundnut. The experiment was conducted during the Kharif 1995 at M. R. S., University of Agricultural Sciences, Dharwad.

Abstract of Theses

Nine cross combinations were obtained by taking Spanish cultivars viz., JL 24, Dh 40 and KRG-1 as ovule parents and crossed with stress resistant moderately dormant and high yielding interspecific derivatives viz., GBFDS 272, VG 101 and CS 16. The parents along with three dormant checks viz., Dh 8, DER and R 8972 were evaluated for various characters. The crosses were assessed for generating productive segregants with resistance to biotic and abiotic stresses besides productivity in F_2 derived F_4 generation.

The late maturing interspecific derivatives were significantly superior to ruling Spanish cultivars for dormancy and resistance to foliar disease. Among them GBFDS 272 was also superior for resistance to damage due to *Sclerotium rolfsii* (DSL) and *Spodoptera litura* (DSP). But early maturing Spanish entries recorded high pod loss due to increased incidence of in situ germination and *S. rolfsii*.

When phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were taken as indicators of variation, moderate to high level of variation was evident for DSL, DSP and dormancy while it was low for remaining green leaf area (RGLA), pod yield (PY), shelling per cent (SP) and sound mature kernel per cent (SMK).

Heritability was high for dormancy and moderate for biotic stresses. Genetic gain was maximum for dormancy followed by DSL and DSP but was low for RGLA, PY, SP and SMK.

Significant differences were not evident in the mean performance of the crosses indicating futility of selection among crosses. Crosses as a whole were significantly potential for gicing frequency of desirable segregants for DSL and DSP but it was low for RGLA. Only 38.3% of plants turned out to be erect-sequential and early maturing while frequency of significantly superior erect segregants for other characters were low. But proportion of such plants were comparable to that of whole population. Thus, it would be possible to enhance the frequency of desirable erect segregants simply by increasing.

Although frequency of segregants superior to JL 24 were relatively high in two parameter combinations but frequency of these lines was very low for combinations of more than two characters. Correlation and association analysis showed that different characters were not completely antagonistic to each other. Thus, it would possible increase the frequency of desirable segregants through selective intermating.

Evaluation of New Sources of Cytoplasmic Male Sterility and Correlation Studies in Sunflower (*Helianthus annuus* L.)

C. H. ABDUL GAFOOR

1997

MAJOR ADVISOR : Dr. S. A. PATIL

The present study was undertaken with a view to evaluate two new sources of male sterility, FMS (*Helianthus petiolaris* ssp *petiolaris*) and IMS (*H. annuus* ssp *lenticularis*) for their commercial exploitation. The influence of new cytoplasm on important traits, correlation, path analysis and heterosis were also studied in addition to restorer/maintainer behaviour of inbred lines. Three sets of alloplasmic male sterile lines and eleven male fertile lines were the base material. A total of 34 hybrids were developed during late Kharif 1995. The three sets of alloplasmic along with parents were sown in RCBD in three replications.

Plant yield had significant positive association with head diameter, test weight, percentage of seed set. The path analysis revealed that, test weight and head diameter were the most important characters for improving the yield and percentage of seed set was found to be the most important determinant of oil content as they showed maximum direct

effect and highest positive correlation. Among the hybrids tested the hybrids FMS 852A X Tub 346 showed significant heterosis for both seed yield and oil content and hence can be exploited. The hybrids IMS IB24 X 232, IMS IB24 X Tub 365, IMS IB24 X Tub 346, FMS IB24 X Tub 232, FMS IB24 X Tub 365, CMS 852A X Tub 365, CMS 852A X Tub 232 etc., found to be promising.

The study on influence of new cytoplasm on important traits revealed that, the new sources of male sterility did not show any negative depressive effects on important quantitative traits. However, the hybrids with new cytoplasm showed superiority over the classical hybrids with *petiolaris* cytoplasm for oil content. Therefore, these new CMS sources can replace the classical CMS source with added advantage of oil content. None of the lines tested were proved to be the complete fertility restorers of the new sources. However, some lines behaved as a partial restorers.

**Genetic Studies on Sweet Stalk Based Forage Sorghum
(*Sorghum bicolor* L. Monech) Hybrids**

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1997

MAJOR ADVISOR : Dr. S. J. PATIL

Study was undertaken to evaluate the sweet stalk sorghum genotypes for their performance in respect of fresh plant weight, stalk weight, total soluble solids, volume of juice per plant and other fodder related characteristics. The combining ability and gene action studies of fodder characteristics, to test F_1 hybrids in comparison with parents, to evaluate hybrids for fertility restoration, performance of hybrids and to identify suitable hybrids for ratoon crop, were the other objectives.

The experiment material consisted of four male-sterile lines viz., 323A, M31-2A, SB-401A and DKMS-9108A and twelve sweet stalk sorghum cultivars viz., SSV-84, SSV-15611, SSV-53, SSV-6925, SSV-2525, Rio, SSV-7073, SSV-108, SSV-74, SSV-96, SSV-119 and HES-4. The 48 hybrids along with 16 parents were evaluated in a field experiment with RCBD design and data collected in respect of 12 quantitative characters were analysed by using Line x Tester

method in main crop, and subsequently all measures were taken to raise ratoon crop and the data obtained from ratoon crop also processed as in case of main crop. Fertility restoring ability of F_1 's was confirmed through pollen studies. Among female parents, SB-401A and in males HES-4 found to be good general combines.

The hybrid 323A x Rio performed well both under main and ratoon crop out of 48 hybrids for fresh plant weight. The other hybrids which performed well for total soluble solid both in main and ratoon crops were SB-401A x HES-4 and SB-401A x SSV-12611. These hybrids had high mean performance and high per cent heterosis. Five sterile hybrids were obtained with M31-2A and SB-401A and DKMS-9108A as female parents produced two and one sterile hybrids each.

The SCA variance was higher for most of the traits which indicated the feasibility of exploitation of heterosis for commercial purpose. Sweet stalk sorghum genotypes have potentially from the point of high quality, quantity fodder production and various industrial uses.

Evaluation of Groundnut Mutants for Resistance to *Spodoptera* and Thrips

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1997

MAJOR ADVISOR : Dr. M. V. C. GOWDA

The present investigation was carried out to identify genotypes resistant/tolerant to *Spodoptera litura* and thrips, besides good productivity attributes. The 22 mutants derived from VL 1 were screened against *S. litura* during Kharif 1996 and against thrips during Summer 1997 along with susceptible (JL 24) and resistant (GBFDS 272) checks.

The mutants 28-1, 28-2, 45 and 110 were resistant to *S. litura*. Along with these, the mutants 2-1, 139-1 and VB type were also found to be resistant to thrips.

The mutants (28-2, 45 & 110) possessed good pod and kernel features and matured early by 10 to 15 days than resistant germplasm. The above features of mutants (28-2, 45 & 110) were comparable to popular Spanish Bunch varieties

cultivated in Karnataka. The mutants 28-2, 45 and 110 showed high level of resistance to leaf spots and variable level of resistance to rust, indicating their potentiality in genetic improvement of groundnut for multiple pest and disease.

In laboratory rearing of *S. litura* on selected genotypes the mutant 45 recorded less number of larvae and higher percentage of mortality throughout the life cycle. The mutant 28-2 showed significantly low larval weight and low gain in weight at all the stages of larval period indicating the possible existence of two independent mechanisms of resistance. The mutants 28-2 and 45 extended the larval period by 3 days and affected the fecundity of moths as well reflecting the possible role of antibiosis as a mechanism of resistance.

Abstract of Theses

The genotypes showed significant variation for various leaf anatomical parameters but no perceptible association with resistance was evident. The genotypes also differed significantly for general group of chemicals viz.,

phenols, OD phenols, tanins and total sugars but their differences were not associated with resistance to *S.litura* and thrips indicating the possible role of specific chemical factors in antibiosis.

Genetic Studies in Okra (*Abelmoschus esculentus* L. Moench)

J.R. LAKSHMI PRASANNA

1996

MAJOR ADVISOR : Dr. B. B. MADALAGERI

Okra is a common vegetable crop grown under tropical and subtropical conditions. An attempt was made to develop F_1 hybrids at the Division of Horticulture, University of Agricultural Sciences, Dharwad during 1996.

The experiment material consisted of 10 hybrids from five parents namely Arka Anamika, PI 496618, PI 489818, PI 500150 and PI 496647 and one commercial check hybrid namely Mahyco No. 7. The data were analysed to elicit information on heterosis and combining ability for various growth, yield and quality attributes using Randomised Block Design.

High amount of heterosis was achieved with respect to marketable yield in many crosses even over the best parent

and check. The combining ability analysis indicated that GCA and SCA variances were significant for all the 24 characters studied. The variance due to SCA was higher in all the characters except for length of pedicle, days for first flowering, days for 50 per cent flowering, length of fruit, girth of fruit and the number of pods infested with borer per plant.

The GCA effects indicated that none of the parents was a good general combiner for all the characters suggesting that separate parents will have to be used for improvement of different traits. The outstanding cross combinations with positive heterosis over check for marketable yield and low incidence of borer were Arka Anamika X PI 496618 and PI 496618 X PI 500150.

Studies on Nutrient Requirement for Rainfed Cultivation of HPS-7/67 TPS Transplants

MAHESH R. PATIL

1996

MAJOR ADVISOR : Dr. M. B. MADALAGERI

Field experiments were conducted at the Division of Horticulture, University of Agricultural Sciences, Dharwad during *Kharif* 1995 and 1996 to study the nutrient requirement for rainfed cultivation of HPS - 7 / 76 TPS transplants. During 1995, three major nutrients each at three levels (N at 50, 100 and 150 kg ha⁻¹, P at 50, 75 and 100 kg ha⁻¹ and K at 50, 100 and 150 kg ha⁻¹) were tested at all possible combinations along with unfertilized check (control) in 3³ factorial randomized block design. During 1996, the top performing treatments from 1995 results were retested along with check in a Randomized Block Design.

The 1996 *Kharif* was a favourable season recording 70.0 per cent higher tuber yield than 1995. The HPS - 7 / 67 transplants responded upto 150 kg N ha⁻¹ recording higher total (7.6 t ha⁻¹) and medium sized tuber yield (3.6 t ha⁻¹) over

unfertilized check. Higher values for number and weight of tubers per plant and for most of the growth attributes were recorded at 150 kg N ha⁻¹. Phosphorus and potassium application each at 50 kg ha⁻¹ were found optimum recording higher tuber yield of 5.3 and 5.9 t ha⁻¹, respectively.

A nutrient combination of 150:50:50 kg NPK ha⁻¹ with a mean tuber yield of 11.5 t ha⁻¹ over two seasons was found optimum for HPS - 7 / 67 transplants. This combination was also the most economic recording higher net production value (2.63).

While the applied N, P and K have improved their uptake in the plants, they did not affect the keeping quality of the tubers.

Inheritance of Compound Cyme and Its Utility in Tomato Improvement

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1996

MAJOR ADVISOR : Dr. B. B. MADALAGERI

Investigations on generation mean analysis involving interbarietal cross of two contrasting parents : compound inflorescence with jointless pedicel [CIJ(B)] and simple inflorescence with jointed pedicel [SIJ*] of tomato were conducted using randomized block design at the Division of Horticulture, University of Agricultural Sciences, Dharwad during the year 1995-96.

The study was carried out to obtain information on nature of gene action for compound cyme character, estimates of gene effects, scaling tests, heritability, genetic advance, heterosis, inbreeding depression and degree of dominance for yield and yield attributing characters and quality traits.

The results on the estimates of means and variance from generation mean analysis indicated that backcrossing F_1 to superior parent resulted in superior progeny and that to inferior parent resulted in inferior progeny for a particular

character and F_1 was found to be intermediate with respect to means and variances for most of the traits.

Scaling tests indicated presence of epistasis for all characters except for number of flowers per cyme. While, degree of dominance was found to be more than unity for all the characters observed.

Majority of the traits revealed, significant heterosis in F_1 and significant inbreeding depression in F_2 . All the three type of gene effects viz; additive, dominance and epistasis was found to be operating for most of the traits.

The heritability estimates were moderate to high (in broad sense). Genetic advance over per cent of F_2 mean was highest for number of flowers per cyme while, other traits showed moderate to low estimate.

The compound cyme character was found to be controlled by recessive genes and the chi-square test indicated good fit for digenic segregation of 9:3:4.

Studies on Propagation of *Poinsettia leucocephala* Willd var. *alba hort.* By Stem Cuttings under Mist

UMESH R. NANDI

1997

MAJOR ADVISOR : Dr. U. G. NALAWADI

The investigation on propagation in *Poinsettia leucocephala* Willd var. *alba hort.* by different types of cuttings as influenced by growth regulators under mist were carried out during 1995-96 at the Kumbapur farm attached to the division of Horticulture, University of Agricultural Sciences, Dharwad.

The growth regulators treatments comprised of use of Indole butyric acid (IBA) and Napthalene acetic acid (NAA) applied singly and in combination at different concentrations. The observations on rooting and root characters of the cuttings and various bio-chemical constituents such as reducing sugars, non-reducing sugars, total sugars, starch, total carbohydrates and total free phenols in different types of cuttings were analysed.

The cuttings treated with IBA + NAA 3000 ppm (8.63) recorded maximum number of roots followed by NAA

4000 ppm (8.35) in semihardwood cuttings and IBA + NAA 2000 ppm (8.17) and NAA 3000 ppm (7.75) in tip cuttings of *Poinsettia leucocephala*.

The highest rooting percentage was obtained in semihardwood cuttings treated with IBA + NAA 3000 ppm (85.42%). In tip cuttings treated with IBA + NAA 2000 ppm (60.00%) was found better.

Tip cuttings had higher initial levels of sugars and free phenols with low levels of starch than semihardwood cuttings. Among the growth regulators NAA either alone or in combination with IBA had significant influence on these constituents during the course of rooting.

The studies revealed that *Poinsettia* shrubs could multiplied easily by pre-treatment of semihardwood cuttings with IBA + NAA 2000 ppm or IBA + NAA 3000 ppm in sand medium under mist.

Effect of Post-Harvest Treatments on Physico-Chemical Changes and Shelf-Life of Mango Fruits (*Mangifera indica* L.)

S. ABBAS HUSSAIN

1997

MAJOR ADVISOR : Dr. P. NARAYAN REDDY

An investigation entitled "Effect of post-harvest treatments on physico-chemical changes and shelf-life of mango fruits (*Mangifera indica* L.)" was carried out in the division of Horticulture, Regional Research Station, Raichur during 1995-96. The separate experiments were conducted on Khader and Neeleshan cultivars as their maturity differed. Treatments included : waxol, calcium nitrate, GA, NAA, kinetin and Bavistine at different concentrations in addition to hot and cold water dip. The experiment was laid out in completely randomized design.

The fruits of Khader and Neeleshan treated with NAA (4000 ppm) and waxol (6%) stored well upto 13 and 15

days, respectively. Both the cultivars recorded significantly lowest physiological loss in weight when compared to untreated fruits. The fruits treated with these treatments retained higher total soluble solids, Ascorbic acid, chlorophyll content and sugars than rest of the treatments. The untreated fruits had shorter shelf-life with maximum physiological loss in weight and decay loss.

However, calcium nitrate (1.5%), Bavistine (1000 ppm), cold water (0-5°C) and hot water (52 ± 1°C) treatments were found to be superior to control without much loss in the quality and appearance.

Effect of Packages and Chemicals on Post-Harvest Physiology of Thompson Seedless Grapes in Transportation and Different Storage Conditions

N. S. MANGASULI

1997

MAJOR ADVISOR : Dr. B. SATHYANARAYANA REDDY

An investigation was carried out in the laboratory of the Department of Horticulture, College of Agriculture, Bijapur, University of Agricultural Sciences, Dharwad during 1996 to study the effect of packages and chemicals on post-harvest physiology of Thompson Seedless grapes in transportation and different storage conditions.

Post-harvest treatment of GA₃ was given (100 ppm) as a dip treatment and potassium metabisulphite (2g per 2 kg grapes) was given as a in-package fumigant. Treated grapes were packed in woven baskets (WB) and corrugated paper boxes (CPB) and were transported for a distance of 200 km. Transported grapes were stored under ambient storage (at 30.2 - 34.7°C, 33.5 - 51.1% RH), zero energy cool chamber (at 23.5 - 27.1°C, 73 - 75% RH) and cold storage (at 6.5 ± 0.5°C, 69 ± 1 % RH).

In transportation, grapes packed in CPB recorded lower PLW, physical damage, berry drop, TSS and titrable acidity as compared to those packed in WB. KMS treatment

reduced the berry drop and GA₃ treated grapes retained lower levels of acidity as compared to untreated grapes. Packages and chemicals did not effect ascorbic acid and sugar contents of grapes.

Grapes packed in CPB and stored under cold storage recorded minimum PLW, decay loss, berry drop and higher organoleptic scores. Further, packing of grapes in CPB and storing in cold storage resulted in minimum alteration of sugars and better retention of TSS, titrable acidity, TSS to acid ratio and ascorbic acid. KMS treatment reduced the decay loss, berry drop and recorded higher organoleptic scores. On the other hand GA₃ treated grapes recorded less PLW and had minimum alteration in TSS, titrable acidity, ascorbic acid, sugars and higher scores of taste and flavour. Combination of KMS + CPB in the cold storage enhanced the storage life of grapes up to 32 days.

Studies on Propagation of Pomegranate (*Punica granatum* L.) by Cutting

H. A. RAJARAM

1997

MAJOR ADVISOR : Dr. P. B. PATIL

A study on propagation of pomegranate by cuttings was undertaken at the college of Agriculture, University of Agricultural Sciences, Dharwad during 1995-1996.

Twentyone pomegranate cultivars were screened to classify them into easy-to-root and difficult-to-root cultivars, secondly effect of growth regulators either alone or in combination to improve rooting of cuttings in difficult-to-root cultivars viz., Basien seedless and Ganesh and the role of biochemical constituents affecting rooting such as starch, total sugars, total phenols and total nitrogen were studied in comparison with an easy-to-root cultivars Gulsan Rose.

Eighteen treatments comprising of IBA at concentrations of 5000, 6000 and 7000 ppm NAA at 2000, 3000 and 4000 ppm, Cultar at 500, 1000 and 1500 ppm and combination of IBA + NAA and IBA + Cultivar with untreated control were kept under mist by soaking of cuttings in water

for 12 hours were randomized in completely randomized block design with 2 replications.

In general, growth regulators either alone or in combination increased the rooting percentage and improved root characteristics. In Ganesh cultivar, cuttings treated with a combination of IBA + Cultar at 2500 ppm each gave maximum percentage of rooting and better root parameters. In Basein Seedless, cuttings which received a treatment of IBA + Cultar at 2000 ppm each exhibited highest rooting percentage and improved root characteristics.

Biochemical studies indicated that Gulsan Rose an easy-to-root cultivar contained a higher percentage of total sugars, total phenols and lower percentage of Starch and total nitrogen compared to Basein seedless and Ganesh which were found to be difficult-to-root cultivars.

Studies on the Effect of Nitrogen and Phosphorus on Growth, Yield and Quality of Onion (*Allium cepa* L.) Cv. Telagi Red

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1997

MAJOR ADVISOR : Dr. H. B. PATIL

An investigation was carried out to study the effect of nitrogen and phosphorus on growth, yield and quality of onion (*Allium cepa* L.) Cv. Telagi Red. A factorial experiment with four levels of nitrogen and phosphorus each, comprising 16 treatments was laid out in randomized block design with three replications during *Kharif* season of 1996 at the College of Agriculture, Bijapur.

Plant height, number of leaves, leaf area and neck diameter were found to increase significantly with the increase in levels of nitrogen. Application of nitrogen significantly influenced the net assimilation rate, relative growth rate and crop growth rate. Phosphorus fertilization and interaction and estimated growth parameters.

The maximum total dry matter production as well as dry matter accumulation in different plant parts of onion were observed with higher levels of nitrogen and phosphorus.

There was increase in the yield as well as yield contributing characters like bulb diameter and bulb length with

increasing levels of nitrogen and phosphorus. Higher total yield was observed with 150 kg N and 75 kg P per hectare which was on par with 150 kg N and 50 kg P per hectare.

Increasing levels of nitrogen, phosphorus and their interaction did not effect the total soluble solids. The higher yield of medium and large sized bulbs were obtained at higher levels of nitrogen and phosphorus.

Higher contents of N, P and K as well as total uptake of N, P and K were observed with the higher levels of nitrogen and phosphorus.

Among all treatment combinations, fertilizer dose of 150 kg nitrogen and 50 kg phosphorus per hectare was found to be most remunerative in respect of net returns.

Storage life of onion bulbs were significantly reduced with increased nitrogen fertilization. Applied phosphorus and its interaction with nitrogen did not show significant difference.

Abstract of Theses

Effect of Plant Population and Time of Pruning on Growth and Flower Yield of Jasmine (*Jasminum sambac* Alt.)

H. P. SUMANGALA

1997

MAJOR ADVISOR : Dr. M. M. RAO

An experiment was conducted to find out the optimum plant population and time of pruning in *Jasminum sambac* Alt. during 1995-96 at Horticulture unit of New-orchard of Department of Horticulture, University of Agricultural Sciences, Dharwad.

The experiment was laid out in 2 Factorial Randomized Block Design with 12 treatment combinations comprising of four different dates of pruning viz., early (8-12-1995), early-mid (18-12-1995), late-mid (28-12-1995) and late (8-1-1996) pruning and three spacing levels viz., narrow (2x1 m or 5,000 plants per hectare), medium (2x2 m or 2,500 plants per hectare) and wider spacing (2x3 m or 1667 plants per hectare).

The study pointed out that among the different spacing levels tried, the spacing 2x1 m recorded the highest

yield (4095.26 kg per hectare). However, spacing of 2x3 m promoted higher parameters in respect of primary shoots, sprouts, productive shoots and leaves. Consequently, the per plant yield was also more with this treatment.

Among the different pruning dates tried, pruning on 18-12-1995 encouraged better vegetative growth that resulted in highest yield of flowers (4069.41 kg per hectare). The performance of other pruning dates such as 28-12-1995 and 8-1-1996 were next in the order while pruning on 8-12-1995 adversely affected the yield.

From the study, it could be surmised that the higher yields can be obtained by adopting narrow spacing (2x1 m) and early-mid pruning (18-12-1995). Which may be recommended to farmers for maximum productivity of Jasmines.

PLANT PATHOLOGY

Studies on *Alternaria alternata* (Fr.) Keissler - A Causal Agent of Leaf Blight of Turmeric (*Curcuma Longa* L.)

MALLIKARJUN

1997

MAJOR ADVISOR : Dr. SRIKANT KULKARNI

Turmeric leaf blight caused by *Alternaria alternata*, causing considerable damage to the turmeric plant is a serious disease and present in almost all growing areas of Belgaum, Bijapur, Dharwad and Uttara Kannada districts.

Studies on *Alternaria alternata* (Fr.) Keissler-A causal agent of leaf blight of turmeric (*Curcuma longa* L.) includes survey for disease spread and intensity, morphological, cultural, physiological, nutritional studies, spore germination, susceptible stage of the host to infection. Screening of genotypes for resistance and in vitro evaluation of fungi toxicants.

During survey in four districts, the average per cent incidence was found to be 27.75. Plants were most susceptible from 150 days onwards indicating the most vulnerable periods

at later stages for infection by the pathogen. The conidiophores of *A. alternata* are simple or branched, olivaceous or golden brown and measuring 35.21mm long and 13.74 mm wide. The fungus reached maximum growth on 12th day of incubation in potato dextrose broth. Richards's medium supported maximum growth and the temperature of 25°C and pH 6.3 were found to be best for the fungal growth. Sucrose and urea were found to be best carbon and nitrogen sources for the growth of the fungus, respectively.

A relative humidity of 100 per cent, a pH 8.0 and a temperature of 30°C were found to be most favourable factors for maximum spore germination.

The presence and effect of toxic metabolites in the culture filtrate of the fungus was observed through wilting of the tomato seedlings.

Screening of genotypes indicated that, none of the cultivars showed immune reaction to the disease. However, cultivars, viz., Rajapuri, BSR-1 and Bidar-4 showed moderately resistant reaction.

In vitro evaluation studies indicated that, Propiconazole (Tilt) and Ziram (cumon-L) were found to be best systemic and non-systemic fungitoxicants against the pathogen, respectively.

Studies on Mechanism of Resistance to Grain Moulds in Sorghum

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1997

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Studies on mechanism of resistance to grain moulds in sorghum was carried out to understand the relation between resistance to grain moulds and morphophysiological characters of seed. Following aspects viz., evaluation of genotypes against grain moulds, frequency of mycoflora on the grains of different genotypes, water absorption capacity of grains, spore germination in different grain exudates, grain weight, volume, density, colour and germination in relation to resistance, thickness of pericarp layer and quality parameters (starch, total sugars and phenols) were studied.

Grading of different sorghum genotypes was done. Among the selected 25 genotypes, all the genotypes showed below 2.5 grade, whereas susceptible check CSH-1 and 296-B had more than 4 grade. *Fusarium moniliforme* and *Curvularia lunata* were found to be predominant fungi associated with grains even after surface sterilization others were in the order of decreasing severity viz., *Phoma sorghina*, *Exserohilum turcicum*, *Colletotrichum graminicola* and *Alternaria alternata*.

In the artificial inoculation of fungi on the sorghum grain, genotypes found to be resistant were SPGM-94045, DGS-4-1 and GMRP-9(b) to *Fusarium moniliforme* and IS-14332, GMRP-32 and GMRP-36 to *Curvularia lunata*. There was no correlation between susceptibility and water absorbing capacity of grains. Maximum reduction in spore germination of *F. moniliforme* was observed in grain exudate of GMRP-45(80.8%). Grain exudate of GMRP-44 showed reduction of 82.6 percent to *C. lunata*. Thousand grain weight was more in resistant genotypes, but grain volume was less, grain density and germination per cent were also more. Resistant genotypes were found in the both red creamy coloured grains. Thickness of pericarp layer was more in susceptible genotypes viz., CSH-1 and 296-B. The phenolic content was more in SPGM-94052 and starch content was highest in IS-14332, but there was no significant difference among the genotypes with regard to total sugars. There is a positive correlation between grain exudates and susceptibility.

Study on Post-harvest Diseases of Vegetables in Parts of Northern Karnataka

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1997

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Postharvest disease of vegetables in parts of Northern-Karnataka were studied in all three seasons pathogens associated with the diseases were isolated, identified and their disease symptoms were described. The seasonal variation in different disease was correlated with the weather parameters. Host range studies and management of some vegetable disease were under taken.

Thirteen species of fungal pathogen causing seventeen diseases were observed on eleven different vegetables. A maximum number of two fungi were associated

with the decay of onion, garlic, cauliflower, chilli, clusterbean and ridgegourd. Only one fungus was observed on each of cabbage, carrot, tomato, bittergourd and potato. *Aspergillus niger* (black mold rot) and *penicillium* sp (blue mold rot) were isolated from both onion and garlic. *Alternaria brassicicola* was observed on both cauliflower and cabbage. Similarly, *Rhizopus nigricans* was observed both on carrot and ridgegourd. *Colletotrichum capsici* (anthracnose) on chilli, *Alternaria cymoposidis* (black rot) and *Fusarium roseum* (general rot) on clusterbean, *Fusarium semitectum* (*Fusarium* rot) on