

ABSTRACTS

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J. Cotton Res. Dev. 18(2) 125-127 (July, 2004)

Free fatty acid test as a viability index of cotton seed

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ABSTRACT : An experiment on prediction of seed quality was conducted on 12 genotypes belonging to *Gossypium hirsutum* (H-777, H-1098, HS-6, H-1117, H-974 and F-846) and *G. barbadense* (RG-8, HD-364, HD-107, HD-123, HD-394 and LD-327) with the help of four tests. Standard germination had significant positive correlation with tetrazolium test (0.84), respiration rate test (0.85) and cutting test (0.84) and significant negative correlation with free fatty acid test (-0.86). Free fatty acid test was also observed to have significant negative correlation with cutting test (-0.89) and dehydrogenase activity test (-0.62). The indicated that free fatty acid test alone was capable to define various seed viability indices and could predict standard germination. A regression analysis of above tests showed that a combination of above four tests could predict seed germinability to a very reliable level ($R^2=0.82$).

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Genotypes x environment interaction for yield and quality traits in GMS based hybrids of *G. hirsutum* L.

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ABSTRACT : An investigation was conducted to study the stability parameters of 48 genetic male sterility based upland cotton hybrids and standard check (Dhan Laxmi) grown at two locations for two consecutive years. The observation were recorded on seed cotton yield and quality traits. Variances due to genotypes, environments and G x E interaction were significant for all the traits studied, except G x E (linear) for micronaire value. Both linear and non-linear components were important for seed cotton yield, ginning out turn, 2.5% span length, lint index, fibre fineness, maturity co-efficient and bundle strength. G x E (linear) was higher in magnitude than non-linear for ginning out turn, maturity coefficient and seed cotton yield, whereas pooled deviation was higher for lint index, 2.5% span length, micronaire and bundle strength. Simultaneous consideration of all the parameters of stability revealed that only two cross combinations, IAN 579 x A 72-15 and SA 278 x G 6030, were desirable with high mean for seed cotton yield, non-significant bi and S² di values and were more adaptive.

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Heterosis for yield and quality traits in genetic male sterility based upland cotton hybrids

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ABSTRACT : The extent of economic heterosis for yield and quality traits was estimated for 48 genetic male sterility based upland cotton hybrids over four environments. Low to medium heterotic effects was observed for all the characters studied. For seed cotton yield hybrid SA 278 x A 72-15 exhibited highest

heterosis (32.36%). Cross combinations exhibiting heterosis for seed cotton yield were generally poor in quality. Hybrid IAN 579 x Tamcot SP 37H for G. O. T. (4.76%), IAN 579 x GS 1925 for 2.5% span length (8.19%), SA 278 x GS 1925 for fibre fineness (-14.29%), IAN 579 x H 1098 for lint index (20.93%), IAN 579 x HP Acala for maturity coefficient (9.72%), and IAN 579 x J₂P₇ for bundle strength (3.91%) depicted highest heterotic effects.

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Association and path analysis in the selections made from colour linted *Gossypium hirsutum* cotton germplasm

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ABSTRACT : Fifty one single path selections of different colour linted genotypes of *Gossypium* were evaluated in a randomized block design with three replications during *khari* 1997-98. Analysis of variance revealed highly significant differences among genotypes for all the traits studied. High estimates of GCV, heritability and genetic advance were observed for seed cotton yield/plant, number of bolls/plant and plant height indicating that selection would be effective for these traits. Seed cotton yield/plant exhibited significant positive association with number of bolls/plant and plant height. Number of bolls/plant also exhibited positive and high direct effects on yield. It was concluded that number of bolls/plant was the most important component character for selection of genotypes with high potential of seed cotton yield.

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New thrust area for breeding quality *arboreum* cotton

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ABSTRACT : *Gossypium arboreum* is a native of India and is cultivated since time immemorial in all the cotton growing states. *Arboreum* cottons are usually drought tolerant, coarse and short staple with high moisture absorbency. The common *arboreum* breeding goals have been the development of varieties with high yield, high ginning out turn and insect/disease resistance. Of late cotton cultivation is becoming quite a challenge for the reason of adverse climatic conditions, severity of insects pests attack, etc. The *arboreum* cottons have been found to be able to sustain their productivity to some extent. Subsequently, development of varieties in medium staple length group comparable to *G. hirsutum* varieties, spinnable upto 20-30 counts needed more attention in future *arboreum* cotton breeding programme. Development of GMS and CMS background hybrids and improvement in seed oil content without reduction in lint yield will be an added advantage. Concerted efforts are needed for the development of *arboreum* cotton varieties and intra specific hybrids with high yield and good quality traits. The quality *arboreum* strains and hybrids identified for North zone are RG-10, RG-136, HD-305, RAJDH-7, LDH-11 and AAH-3. These strains and hybrids are suitable under cotton-wheat rotation, tolerant to sucking pests and need to be populized.

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Heterosis for yield and its component traits in genetic male sterility based upland cotton hybrids

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ABSTRACT : Forty-eight genetic male based upland cotton hybrids were evaluated to estimate the extent of economic heterosis for yield and its component traits over four environments. For seed cotton yield, the hybrid IAN 579 x G 67 exhibited highest heterosis (36.55%) and also significant heterosis for number of monopods, number of bolls/plant and seed index. The other promising hybrids were AS 278 x A 72-15 and IAN 579 x Badnawar, which recorded more than 30 per cent economic heterosis for seed cotton yield. These three hybrids were suggested for further exploitation after multi-location testing. Cross combinations exhibiting heterosis for seed cotton yield also showed high heterosis values for either of its component traits viz., number of bolls, boll weight and other characters such as number of monopods, number of sympods and seed index.

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Combining ability studies in cotton (*Gossypium arboreum* and *G. herbaceum*)

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ABSTRACT : Eight genetically diverse genotypes of *desi* cotton (*Gossypium arboreum* and *G. herbaceum*) were assessed for combining ability of 11 economic characters using diallel crossing system. The estimates of general combining ability variances indicated that both additive and non additive gene actions were involved in the expression of seven characters, while for number of monopodia/plant and staple length of fibre only additive type gene action was involved. The parents AKA-8808, JLA-1693 and AKA-8401 were the good combiners. The crosses JLA-0193 x AKA-8808, JLA-1693 x JLA-0193, JLA-1693 x JLA-0393 and AKA-8808 x PA-141 were identified with good specific combiners for seed cotton yield and yield contributing characters.

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Identification and characterization of suitable cotton species for different rainfed agro-ecological situations of Madhya Pradesh

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ABSTRACT : An attempt was made to identify and characterize suitable cotton species for different rainfed ecological situations of Madhya Pradesh. Six situations were marked on the basis of rainfall and soil depth. The genotypes of *Gossypium arboreum* were found to be the best performers in all the situations, except in situation having deep soil with low rainfall. In this situation, the *herbaceum* genotypes were found to be most suitable. The characters exhibited by genotypes in different situation were also recorded for assisting in evolving situation specific management strategies.

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Stability analysis of seed cotton yield and fibre quality characters in *desi* cotton (*Gossypium arboreum* L.)

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ABSTRACT : Stability analysis were carried out to study the G x E interaction for seed cotton yield and quality traits in *desi* cotton. Variance due to genotypes, environments and G x E interaction were significant for all characters. Both the linear and non-linear components were found significant. Simultaneous consideration of all the parameters of stability revealed that only three genotypes, namely, 14C543, 11C536 and 16C534 were found stable for yield whereas hybrid 14C533 was stable for quality parameters.

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Effect of soil temperature on seedling survival in *Gossypium* spp. under different environments

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ABSTRACT : Studies were undertaken at research farm of Department of Agricultural Meteorology CCS Haryana Agricultural University, Hisar (lat. 29° 10'N, Long. 75° 46'E, 215.2 m a.m.s.l) during *kharif* 2000, 2001 and 2002 to compare the influence of different soil temperature on germination percentage and survival of seedling of *Gossypium* spp. A thermo-tolerance index (T I) was define and genotypes were ranked accordingly for this trait which was shown to be heritable. On an average maximum germination was in HD 123 (61%) and HHH 81 (60%). The thermo-tolerance values were higher in HD 123. It was suggested that the data obtained on final emergence may be combined with that for T I to prepare survival index as a guide to environmental adaptation.

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Effect of fertilizers and spacings on yield parameters of intraspecific hybrid Phule-492 under summer irrigated conditions

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ABSTRACT : A three year (2000-2001 to 2002-2003) study was conducted at Cotton Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri to evaluate the effect of fertilizers and spacings on yield parameters of hybrid, Phule-492, in comparison with NHH-44. Phule-492 produced maximum plant height (128.22 cm), number of bolls/plant (60.0), boll weight (3.40 g), yield/plant (99.5 g) and seed cotton yield (19.73 q/ha) and was significantly superior to hybrid NHH-44 (19.27 q/ha) in producing seed cotton yield. Application of higher dose of fertilizers (i.e. 120 : 60 : 60 NPK kg/ha). Significantly increased seed cotton yield (20.84 q/ha) as compared to recommended (100 : 50 : 50 NPK kg/ha) and lower dose (80 : 40 : 40 kg/ha). Among the three spacings tested, 90 x 90 cm was found to be significantly superior (21.89 q/ha) over others. The interaction effects were found to be non-significant.

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Effect of foliar application of inorganic nutrients on yield of American cotton

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ABSTRACT : Field studies were conducted to study the effect of foliar application of nutrients on yield and yield components of American cotton at PAU, Regional Station, Faridkot during *kharif* 2000 and 2001. The treatments were spray of 2.0% potassium nitrate (KNO₃), 2.0% di-ammonium phosphate (DAP), 2.0% single super phosphate (SSP), 0.5% zinc sulphate (ZnSO₄) and 1.0% magnesium sulphate (MgSO₄) at peak flowering stage during 2000, and the same treatments, except 1.0% MgSO₄, were followed during 2001. The highest yield was obtained with 2.0% KNO₃, followed by 2.0% urea. These two treatments were on par but resulted in significantly higher seed cotton yield as compared to 2.0% DAP, 2.0% SSP, 0.5% ZnSO₄ and 1.0% MgSO₄ treated plots and control. DAP (2.0%) and ZNSO₄ (0.5%) were found superior to 2.0% SSP, 1.0% MgSO₄ and control. All the yield contributing characters behaved in similar manner as seed cotton yield. Treatments 2.0% KNO₃ and 2.0% urea provided higher B : C ratio.

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Direct and residual effects of sulphur on growth, yield and quality of cotton (*Gossypium hirsutum*) - mustard (*Brassica juncea*) cropping system

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ABSTRACT : Field experiments were conducted in 1998-99 and 1999-2000 to study the direct and residual effects of sulphur application in cotton-mustard cropping system at Sirsa, Haryana. Results indicated that dry matter and seed cotton yield, stover and seed yield of mustard, content of S and protein in seeds of cotton and mustard increased significantly by recommended NPK with S @ 30 kg/ha applied to both crops over NPK alone (no sulphur). Pooled data revealed significant increase in seed cotton (22.5%), mustard seed (31.4%), protein content in seeds of cotton (4%) and mustard (3.4%) and oil content in mustard seed (5.3%) by addition of S with NPK over NPK alone, to both the crops. Yield and yield components of mustard were also increased by residual S applied in the preceding crop. However, marginal increase in oil content of cotton seed was observed by S application. Monetary gross returns calculated on mean yield basis indicated higher values of returns in treatments NPK+S where sulphur was applied to both the crops. Direct application of S @ 30 kg/ha gave on additional returns of Rs.5569 from cotton and Rs. 3888/- from mustard with a total net returns of Rs. 9457/- per ha in cotton-mustard cropping over control.

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Impact of production factors on yield and net returns of hybrid cotton (*Gossypium hirsutum* L.) at farmers field

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ABSTRACT : On farm trials were conducted during *kharif* 1998-99, 1999-2000 and 2000-01 to find out the contribution of different production factors on seed cotton yield and net returns of hybrid cotton (*Gossypium hirsutum* L.). Recommended practices resulted in significantly higher mean seed cotton yield (11.5 q/ha) and net returns (Rs. 13800/ha) as compared with the seed cotton yield (5.6 q/ha) and net returns (Rs.6570/ha) obtained under farmers practice. Seed cotton yield decreased significantly when either of any production factor was withdrawn from recommended practices. The maximum reduction in mean seed cotton yield was due to without plant protection (35.2%, followed by fertilizer (25.2%) and irrigation (16.5%). Net returns followed the same trends.

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Integrated nutrient management in *hirsutum* cotton

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ABSTRACT : Experiments were conducted on sandy loam soil of Sriganaganagar to evaluate the integrated effect of organic and inorganic fertilizer management on the production of *hirsutum* cotton during 2001-2002 and 2002-2003. The soil was low in available nitrogen, medium in available phosphorus and high in available potash. The experiments were laid out in randomized block design with ten treatments replicated thrice. The results indicated that treatment T₈ (50% NPK+10 t FYM/ha+foliar nutrition) recorded the highest seed cotton yield (1940 kg/ha) and remained statistically *on par* with T₆ (100% NPK+5 t FYM/ha), T₇ (50% NPK+10 t FYM/ha) and T₉ (100% NPK+10 t FYM/ha) during both the years and on pooled data basis. It gave 12 per cent higher seed cotton yield over recommended dose of fertilizers. This treatment also produced highest number of bolls/plant, higher boll weight and plant height than other treatment combinations during both the years.

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Effect of irrigation methods, fertilizer levels and green manuring on yield and nutrient balance in summer cotton

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ABSTRACT : An experiment was conducted during summer seasons 2000 to 2002 at Rahuri to study the effect of irrigation methods, fertilizer levels and green manuring on cotton yield. Drip and central furrow irrigation in paired row planting resulted in 33.71 and 19.89 per cent higher seed cotton yield over furrow irrigation, respectively. The mean seed cotton yield under drip irrigation (29.98 q/ha) was significantly more than central furrow irrigation (26.92 q/ha). Application of 100% recommended dose of fertilizer to cotton (100 : 50 : 50 kg N : P₂O₅ : K₂O/ha) was found to be optimum which recorded significantly more seed cotton yield and was 31.71 and 10.16 per cent higher over 50 and 75 per cent RDF, respectively. Incorporation of sannhemp as green manure increased 9.85 per cent seed cotton yield over that without green manuring. The interaction effect indicated that yield of cotton at 75 per cent RDF with green manuring was statistically *on par* with 100 per cent RDF alone. Similarly drip irrigation with 75 per cent RDF gave comparable seed cotton yield with that of 100 per cent RDF with central furrow irrigation. The nutrient uptake was higher under drip irrigation than central furrow irrigation. The incorporation of sannhemp as green manure resulted in maximum uptake of nutrient than without green manuring.

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Response of *hirsutum* cotton to wider row spacing and potassium in north-western plain zone of Rajasthan

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ABSTRACT : Field experiments were conducted during *kharif* 2000-01 and 2002-03 at Agricultural Research Station, Sriganaganagar to study the response of *hirsutum* cotton to wider row spacing and potassium levels in north-western plain zone of Rajasthan. The data indicated that 67.5 x 30 cm spacing recorded significantly higher seed cotton yield (17.97 q/ha) over 108 x 30 cm spacing (14.85 q/ha) but was statistically *on par* with 75 x 30 cm and 90 x 30 cm and 90 x 30 cm spacing. Application of 20 kg K₂O/ha significantly increased (13.48%) the seed cotton yield over control but was statistically *on par* with 40 kg K₂O/ha.

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Management of root rot of cotton caused by *Macrophomina phaseolina* (Tassi.) Goid. using zinc sulphate and biocontrol agents

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ABSTRACT : Field experiments were conducted to study the management of root rot of cotton incited by *Macrophomina phaseolina* using antagonists and zinc sulphate. Among the treatments tested, soil application of zinc sulphate (50 kg ha⁻¹) plus seed treatment with talc-formulation of *Trichoderma viride* (4 g kg⁻¹) was the most effective in reducing the incidence of root rot to a minimum of 9.7% as against 28.4% in untreated control. This treatment also recorded the maximum germination (86.3%), plant height (89 cm), sympodia plant⁻¹ (13.6), bolls plant⁻¹ (19.3) and seed cotton yield (1371 kg ha⁻¹) as against the minimum of 63.6%, 74 cm, 8.5, 13.6 and 973 kg ha⁻¹, respectively in untreated control.

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Effect of carrier materials on survival and efficacy of *Pseudomonas fluorescens* against *Macrophomina phaseolina*

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ABSTRACT : *Pseudomonas fluorescens* isolated from cotton rhizosphere exhibited inhibitory action against *Macrophomina phaseolina* causing root rot of cotton. Among the carriers, peat and talc were noted to maintain the population at 17.0 x 10⁷ and 16.25 x 10⁷ cfu per g of the product, respectively after 90 days of storage. The efficacy of *Pseudomonas fluorescens* in inhibiting the growth of *Macrophomina phaseolina* was 48.88 and 47.77 per cent in peat and talc, respectively after 90 days of storage.

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Validation of genotypic resistance ratio (GRR) technique to evaluate cotton breeding materials against bollworms

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ABSTRACT : Three groups (B, R and GMS lines) of breeding materials used in hybrid development of cotton were evaluated for their levels of resistance to bollworms under protected conditions for two seasons. Two scales of measurement of tolerance to bollworms were compared : (1) bollworm infestation in open bolls (%) and (2) genotypic resistance ratio (GRR). GRR quantified the combined plant resistance mechanisms to cotton insect pests including the tolerance trait of compensatory growth in response to bollworms damage. Genotypic resistance ratio greater than one indicated higher genotypic compensatory capacity and less than one emphasized the extrinsic protection needed to realise better yields. GRR as a tool for measuring genotypic resistance was tested using commercially grown cultivars which could quantify the inherent resistance in breeding materials accounting for yield potential of the genotype besides their response to vegetative and reproductive damage by insect pests *vis a vis* the entries to be evaluated under natural infestation conditions and their need based control.

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Bioefficacy and persistence of NPV against *Spodoptera litura* Fab. on cotton

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ABSTRACT : Studies on the persistence of *Spodoptera litura* Fab. NPV (SINPV) on cotton @ 300 LE/ha with and without adjuvant (Boric acid @ 0.1%) at different timings of the day revealed that SLNPV persisted longer when sprayed along with adjuvant as compared to when applied alone. Amongst all treatments, higher mortality of *S. litura* larvae was recorded in monocrotophos compared to NPV treatments. Among the timings of NPV, application as evening spray (4-6 pm) recorded higher mortality than afternoon (1-3 pm) and morning (9-11 am) sprays immediately after spray treatment (0 hrs). When the third instar larvae were provided with cotton leaves exposed to different treatments, monocrotophos recorded 76.63 and 75.66 per cent larval mortality in 1996 and 1997 seasons, respectively.

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Biosystematic and biometric studies of pentatomoid bugs (Hemiptera : Pentatomoidea) associated with cotton

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ABSTRACT : Four species of the superfamily Pentatomoidea (Hemiptera : Heteroptera) belonging to two families Pentatomidae and Scutelleridae, were found associated with cotton in Haryana and adjoining area. These were *Dolycoris indicus* Stal. *Nezara viridula* (Linnaeus) of the former and *Fitha ardens* Walker and *Scutellera nobilis* (Fabricius) of the latter family. These species have been described in detail along with their synonymy, diagnostic features, body colouration, morphometrics of important taxonomic characters and illustrations for their easy identification. The juveniles and imago stages of these bugs were observed sucking sap from the vegetative and floral parts of cotton plants.

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Evaluation of cotton (*Gossypium hirsutum* L.) genotypes for their reaction to major sucking pests

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ABSTRACT : Cotton (*Gossypium hirsutum* L.) genotypes were evaluated for resistance against leafhopper (*Amrasca biguttula biguttula*) and whitefly (*Bemisia tabaci*) during 1999 and 2000 crop seasons at CCS Haryana Agricultural University, Hisar. All the genotypes were sown in two rows in 1999 and four rows of six meter length in 2000 crop season. The varieties H 1098 and HS-6 were grown as standard check. The experiment was laid out in RBD with three replications. The field performance in both the years revealed that the genotypes H 1226, RS 2013, H 1250, RS 2098, H 1117 and HS 253 were found to be highly promising because of lower insect pests incidence and higher yield.

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An economic analysis of determinants of cotton diversion under monopoly regime

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ABSTRACT : The Monopoly Cotton Procurement Scheme of cotton is in operation in Maharashtra since 1972. It was originally started to do away with the intrusion of middlemen and to ensure that farmers sell value added cotton products like lint and yarn onwards than raw cotton. The value addition part could not materialize due to lack of forward linkages in the production process. In an effort to identify the causes of diversion of cotton from monopoly regime to open markets, twenty years data on cotton arrivals were collected and analyzed in two monopoly procurement centres in Nagpur district and two open markets in the adjoining state of Madhya Pradesh which revealed that, except for one or two years, price was not a major determinant in the magnitude of cotton diversion, as the prices announced by federation was highest though it was realized by the seller over 6-7 months. Big farmers realized better price. Small and medium farmers too diverted their produce in large numbers, though quantity wise their impact was less. It was concluded that farmers should have choice to choose their buyers. The state should safeguard the interests facilitate of farmers and prepare them for free, and competitive trade before winding up the scheme altogether abruptly.