# SPECIES SUITABILITY IN COTTON TO DIFFERENT AGRO ECOLOGICAL SITUATIONS IN ANDHRA PRADESH

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**Abstract:** Field investigations were conducted at six agro ecological situations in Andhra Pradesh to identify the suitable cotton species/genotypes viz., *arboreums, herbaceums, hirsutums, intra hirsutums* and inter specific hybrids. In deep soil +high rainfall (SI) and medium soil + high rainfall ($S_3$) situations arboretums; in medium soils + low rainfall ($S_4$)and shallow soil + high rainfall ($S_5$) situations hirsutums and in deep soil + low rainfall ($S_2$) and shallow soil + low rainfall ($S_6$) situations intra hirsutum hybrids performed well. When compared over species, irrespective of rainfall highest seed cotton yield was produced in deep soil (18.16 q/ha),followed by medium and shallow soils (6.73 and 6.79 q/ha respectively).Irrespective of soil type under high rainfall situation, arboretums recorded highest seed cotton yield of 21.62 q/ha whereas in low rainfall situation intra hirsutum hybrids performed well (5.92 q/ha).When compared the species, irrespective of rainfall and soil type, arboreums showed superior yield performance (12.77 q/ha), followed by hirsutum varieties (10.72 q/ha) and intra hirsutum hybrids (10.54 q/ha).The overall productivity of cotton species irrespective of soil type, rainfall pattern and species is 10.55 q/ha. The superior species/genotypes with acceptable fibre qualities may be considered for cultivation in different agro climatic situations.

**Key words** :*arboreums, herbaceums, hirsutums, intra hirsutums* and inter specific hybrids, soil, rainfall, agro ecological situation, seed cotton yield.

**Introduction:** In Andhra Pradesh, cotton is an important commercial crop playing pivotal role in socio economic status of the farmers. In recent times cotton cultivation has spread to non-traditional areas. In the absence of suitable technology farmers are growing cotton hybrids irrespective of the soil and climatic and thereby ending in huge losses. So the present study is aimed to elicit information on species suitability to six different agro ecological situations of Andhra Pradesh by covering gradation in soil depth and rainfall pattern.

**Materials and methods:** Six locations were selected in Andhra Pradesh representing 3 soil types (deep, medium and shallow) and two rainfall patterns (high and low) to conduct the above experiment *viz.,* RARS, Lam (deep soil + high rainfall –SI); RARS, Nandyal (deep soil + low rainfall – $S_2$); ARS, Mudhol (medium soil + high rainfall –$S_3$); RARS, Jagityal (shallow soil +high rainfall –$S_5$ )and RARS, Palem (medium soil + low rainfall – $S_4$ and shallow soil +low rainfall – $S_6$). The experiment included three cotton species *viz., G.arboreum, G.herbaceum* and *G.hirsutum* and two tetraploid hybrid combinations, intra hirsutums and inter specific between hirsutum and *barbadense*. Promising entries identified across the country in each species were selected viz., AK 235, PA 183, AK 8401, Aravinda, J. Tapti, Sarvotham and DLSA 17 in *arboreums*; Jayadher, GCot 13, GCot23 and Digvijay in herbaceums; Sahana, LRA 5166, NH 545, GCot 16, L 604 and Khandwa 2 in hirsutum varieties; DHH11, NHH44, GCot H8, JKHy-1 and PHH 316 in intra hirsutum hybrids and DHB 105 in intra specific hybrid group.

The above genotypes were evaluated in 4 rows of 6 m length plots in completely randomized block design with 3 replications during *Kharif* 2000-2001. Need based plant protection measures were taken. Normal agronomic practices recommended to each region were followed. Observations were recorded on five randomly selected competitive plants for seed cotton yield (Kglha), number of boll weight, number of sympodia, number of nodes on main stem, ginning outturn and mean halo length (mm).

Results and Discussions

The data was analysed by using Fisher analysis of variance technique (Singh and Chaudhary, 1985) In all situations all the characters exhibited significant differenced for all the characters under study. The species arboreums performed well under S1 and $S_3$ situations (41.76 and 11.53 q/ha respectively).The performance of herbaceums was poor when compared with others. In $S_2$ and $S_6$ situations the inter specific hybrid recorded highest seed cotton yield of 3.25 and 7.31 q/ha and intra hirsutum hybrids 2.78 and 6.27 q/ha respectively. In $S_4$ and $S_5$ situations hirsutum varieties produced highest seed cotton yield of 9.68 and 12.2 q/ha respectively (table 1) Irrespective of rainfall ,in deep and medium soils performance of arboretum was good (21.9 and 9.0 q/ha respectively).Superiority of arboreums may be due to its lower water requirement, lower rate of transpiration and high harvest index (Sahay et al.,1988). Dhobe et al.,(1988) also reported best

performance of arboreums for SCY in different soil depths. In shallow soils hirsutum varieties recorded highest seed cotton yield of 8.25 /ha(Table 2).

In arboreums SCY decreased with decrease in soil depth (deep -21.95 ; medium-9.00 and shallow – 7.37 q/ha).The reason may be due to the utilization of more nutrients and soil moisture during crop growth period in deep and medium soils. Similar results were obtained by Jagvir Singh and Nimbole (1994), Dhobe et al.,(1990) and Pundarikashudu et al.,(1988 and 1992). Remaining species not showed any particular pattern but performed well under deep soil situations irrespective of rainfall. When compared over species irrespective of rainfall highest SCY was produced in deep soil (18.16 q/ha).I n medium and shallow soils lower yields were recorded (6.73 and 6.79 q/ha respectively).

Under high rainfall situation, irrespective of soil type arboretums recorded highest seed cotton yield of 21.61 q/ha where as in low rainfall , intra hirsutum hybrids performed well (5.92 q/ha)(Table 3).In high rainfall situation highest SCY was produced under deep soil (34.21 q/ha ) whereas under low rainfall situation in medium soils higher seed cotton yields were realized (7.71q/ha).This may be due to high infiltration rate of deep soil. The percentage increase in SCY, irrespective of species is highest in deep soil over medium soil (169.84 %) but the difference is negligible between medium and shallow soils(0.88%) (Table 4).

In S1 and S3 situations arboretum entries showed best performance .In S1, among 7 arboreum entries, Nandyal arboreum entry Aravinda produced highest SCY of 45.78 q/ha, followed by AK 8401 (45.48q/ha) and J.Tapti (43.6 q/ha).In S3, DLSA 17 showed superior performance (13.29 q/ha) followed by J.Tapti and Aravinda (13.18 and 12.39 q/ha respectively).

In S4 and S5 situations hirsutum varieties performed well. In S4, among hirsutum, Khanwa 2 recorded highest SCY of 12.04 q/ha followed by L604(10.24 q/ha) and Sahana (9.89 q/ha).Highest SCY was recorded in Sahana (16.29q/ha) followed by Narasimha and LRA 5166(13.40 and 13.06 q/ha respectively) in S5 situation.

In S2 and S6 situations the inter specific hybrid DHB 105 recorded highest SCY of 3.25 and 7.31 q/ha respectively, followed by intra hirsutum hybrids .In S2 DHH 11 recorded maximum SCY (3.11 q/ha) followed by JKHY -1 and NHH 44 (2.99 and 2.76 q/ha respectively). In S6 situation also DHH 11 produced highest SCY of 8.15q/ha followed by ,G Cot h8(7.38 q/ha) and NHH 444 (6.03 q/ha).

Based on the finding of the above investigations, for S1 and S3 *Gossypium arboretum; forS2 and S5 Gossypium hirsutum and for S4 and S6* Inter hirsutum hybrids may be considered for cultivation.

**References:**


1. Dhoble ,M.V.,Jadhav ,J.K.,N.R. Nadre and V.D.patil (1988).J.Cotton Res.Dev.2:91-93
2. Dhoble,M.V.,D.G.Giri,B.R.Pawar and V,D,Patil (1990).J.Cotton Res .Dev .4:188-194
3. Jagvir Singh and N.N.Nimbole (1994).Effect of soil depths on NPK utilization and yield of different genotypes of cotton under rainfed conditiond.J.Cotton Res.Dev.8(1): 137 – 140.
4. Pundarikashudu,R and N.J.Mudholkar (1988) Effect of soil depth and planting methods on growth and yield of cotton in vertisols " Transaction Int.Workshop,Swell Shrink soils "Na of tional Bureau of soil survey and land use planting , Nagpur , 1988:pp 229-231.
5. Pundarikashudu,; and N.J.Mudholkar and N.P.Wankhade (1992).Ind.J.Agric.Sci.62:263-67.
6. Sahay ,R.K;M.R.K Rao and R.G. Dani and D.Singh(1998).Water use efficiency and productivity of cotton under rainfed condition;Proceedings of international Conference ,Plant Physiology,Feb 15th , Delhi.Abst.4-13,pp 40
7. Singh,R.K and B.D.Chaudhary 1985.Biometrical methods in quantitative genetic analysis. Kalyani publishers,New Delhi.

**Table 1:Mean performance of cotton species for SCY (kg/ha) at different agro-ecological situations in Andhra Pradesh**

| S.NO | Soil type | High rainfall | Low rain fall | Mean |
|---|---|---|---|---|
| **I** | **Deep soil** | | | |
| 1 | *Arboreums* | 4176 | 213 | 2195 |
| 2 | *Herbaceums* | 2992 | 210 | 1601 |
| 3 | *Hirsutums* | 3046 | 247 | 1657 |
| 4 | Intra *Hirsutums* hybrids | 3381 | 278 | 1830 |
| 5 | Inter specific hybrids | 2737 | 325 | 1531 |
| | **Mean** | **3421** | **211** | **1816** |
| **II** | **Medium soil** | | | |
| 1 | *Arboreums* | 1153 | 646 | 900 |
| 2 | *Herbaceums* | 218 | 614 | 416 |
| 3 | *Hirsutums* | 501 | 968 | 735 |
| 4 | Intra *Hirsutums* hybrids | 429 | 870 | 650 |
| 5 | Inter specific hybrids | 151 | 528 | 340 |
| | **Mean** | **575** | **771** | **673** |
| **III** | **Shallow soil** | | | |
| 1 | *Arboreums* | 1154 | 321 | 737 |
| 2 | *Herbaceums* | 708 | 286 | 497 |
| 3 | *Hirsutums* | 1220 | 430 | 825 |
| 4 | Intra *Hirsutums* hybrids | 738 | 627 | 683 |
| 5 | Inter specific hybrids | 778 | 761 | 755 |
| | **Mean** | **955** | **403** | **679** |
| | **Overall mean** | **1650** | **462** | **1055.5** |

**Table 2 :Performance of cultivated cotton species and hybrids for SCY (kg/ha) in various soil types irrespective of rainfall patterns.**

| S.N | Soil type | Deep soil | | | Medium soil | | | Shallow soil | | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rainfall | High | Medium | Shallow | High | Medium | Shallow | High | Medium | Shallow | |
| 1 | *Arboreums* | 4176 | 213 | 2195 | 1153 | 646 | 900 | 1154 | 321 | 737 | 1277.3 |
| 2 | *Herbaceums* | 2992 | 210 | 1601 | 218 | 614 | 416 | 708 | 286 | 497 | 838.0 |
| 3 | *Hirsutums* | 3046 | 247 | 1657 | 501 | 968 | 735 | 1220 | 430 | 825 | 1072.3 |
| 4 | Intra *irsutums* hybrids | 3381 | 278 | 1830 | 429 | 870 | 650 | 738 | 627 | 683 | 1054.3 |
| 5 | Inter specific hybrids | 2737 | 325 | 1531 | 151 | 528 | 340 | 778 | $761 | 755 | 875.3 |
| | **Mean** | **3421** | **211** | **1816** | **575** | **771** | **673** | **955** | **403** | **679** | **1055.5** |

**Table 3: Performance of cultivated cotton species and hybrids for SCY (kg/ha) in high and low rainfall situations irrespective of soil type.**

| | *Arboreums* | *Herbaceums* | *Hirsutums* | Intra *hirsutums* | Inter specific hybrids | Mean |
|---|---|---|---|---|---|---|
| **High rainfall** | | | | | | |
| **Deep soil** | 4176.0 | 2992.0 | 3046.0 | 3381.0 | 2737.0 | 3421.0 |
| % increase over medium soil | 262.2 | 1272.5 | 508.0 | 688.1 | 1712.6 | 495.0 |
| % increase over shallow soil | 261.9 | 322.6 | 149.7 | 358.0 | 251.8 | 258.2 |
| Medium soil | 1153.0 | 218.0 | 501.0 | 429.0 | 151.0 | 575.0 |
| % increase over shallow soil | 259.0 | -23.8 | -59.3 | -41.9 | -80.6 | -39.8 |
| Shallow soil | 1154.0 | 708.0 | 1220.0 | 738.0 | 778.0 | 955.0 |
| **Mean** | **2161.0** | **1306.0** | **1589.0** | **1516.0** | **1222.0** | **1792.0** |
| **Low rainfall** | | | | | | |
| **Deep soil** | 213.0 | 210.0 | 247.0 | 278.0 | 325.0 | 211.0 |
| % increase over medium soil | -67.03 | -65.8 | -74.5 | -68.0 | -38.4 | -72.6 |
| % increase over shallow soil | -33.6 | -26.6 | -42.6 | -55.7 | -27.8 | -47.6 |
| Medium soil | 646.0 | 614.0 | 968.0 | 870.0 | 528.0 | 771.0 |
| % increase over shallow soil | 101.3 | 114.7 | 125.1 | 38.8 | -27.8 | 91.3 |
| Shallow soil | 321.0 | 286.0 | 430.0 | 627.0 | 731.0 | 403.0 |
| **Mean** | **393.0** | **370.0** | **548.0** | **592.0** | **528.0** | **462.0** |

**Table 4 :Performance of cultivated cotton species and hybrids for SCY (kg/ha) in Different soil types irrespective of rainfall.**

| | *Arboreums* | *Herbaceums* | *Hirsutums* | Intra *hirsutums* | Inter specific hybrids | Mean |
|---|---|---|---|---|---|---|
| **Deep soil** | 2195.0 | 1601.0 | 1657.0 | 1830.0 | 1531.0 | 1816.0 |
| % increase over medium soil | 143.9 | 284.9 | 125.4 | 181.54 | 350.3 | 169.8 |
| % increase over shallow soil | 197.8 | 222.1 | 100.9 | 167.94 | 102.8 | 167.5 |
| Medium soil | 900.0 | 416.0 | 735.0 | 650.0 | 340.0 | 673.0 |
| % increase over shallow soil | 22.1 | -16.3 | -10.9 | -4.38 | -55.0 | 0.88 |
| Shallow soil | 737.0 | 497.0 | 825.0 | 683.0 | 755.0 | 679.0 |

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