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DEVELOPMENT OF ADVANCED TOBACCO BREEDING LINES SUITABLE FOR CULTIVATION IN SOUTHERN AND CENTRAL BLACK SOILS OF ANDHRA PRADESH

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Profitable FCV tobacco cultivation depends on availability of high yielding cultivars suitable to particular soil and climate as type, grade and quality of tobacco produced are considerably influenced by these two factors. Tobacco farmers of Southern Black Soils (SBS) of Andhra Pradesh are unable to achieve higher yields and better quality with the existing varieties as they are mostly bred for Northern Black Soils (NBS) conditions and not for SBS conditions. Making available high yielding varieties suitable to SBS conditions increases their profitability and thus improves their economic conditions. To address this issue a breeding programme was evolved at CTRI RS, Guntur with an objective to develop new high yielding FCV tobacco lines suitable for SBS area during the years 2003-2011. Forty five crosses synthesized using ten parents during 2003-04 were evaluated in SBS conditions (B. Nidamnur, Prakasham Dist.) in subsequent season to identify promising crosses. Four advanced lines *viz.*, GH-9#1, GH-9#23, GH-9#25 and GH-10#35 have been identified as they proved superior to check Siri under SBS conditions based on combined analysis of two seasons replicated yield trial data.

Key words: Breeding lines, CBS, FCV tobacco, SLS

INTRODUCTION

Tobacco is grown in Southern Black Soils (SBS) and Central Black Soils (CBS) of Andhra Pradesh under rainfed conditions. The yield levels are often fluctuating due to unpredictable seasons. Apart from these natural constraints, farmers are unable to realize full potential of the existing varieties as they are mostly bred for Northern Black Soil (NBS) conditions, and it is well established that the productivity of tobacco is highly influenced by type of soils and climate (Gopalachari, 1984). In the pursuit of evolving high yielding lines/cultivars to enhance the profitability of tobacco cultivation especially in view of increasing cost of cultivation, a breeding programme was carried out to develop new high yielding FCV tobacco lines suitable for SBS area.

MATERIALS AND METHODS

Forty five crosses were synthesized by crossing ten parents (G 1-1#4, V 3703, KST-26, II-1624, Cy 79, Cy 135 Bhavya, Ratna, Hema, NLS 4) in half diallel fashion during 2003-04. These crosses were evaluated in Southern Black Soils (B. Nidamnur, Prakasham Dist.) and Central Black Soils (CTRI RS, Guntur) to identify promising hybrids. Based on F_1 evaluation, three crosses *viz.*, V-3703 x KST-26, V-3703 x Cy 79 and V-3703 x Hema were found to be promising and were forwarded to F_2 generation for individual plant selections by exercising 0.05% selection pressure. By following pedigree breeding for advancing generations and exercising selection, five promising advanced breeding lines *viz.*,GH-9#1, GH-9#23, GH-9#25, GH-10#35 and GH-14#33 were selected for CBS conditions and six promising advanced breeding lines *viz.*, GH-9#1, GH-9#14, GH-9#22, GH-9#23, GH-9#25 and GH-10#35 were selected for SBS region. Replicated yield trials were conducted using these lines (with five lines in CBS and six lines in SBS conditions) from 2009-2011 along with the standard checks Hemadri, VT 1158 and Siri in RBD with four replications. The plot size was 32 plants with 70 50 cm spacing and recommended agronomic practices were followed. However for the year 2010-11, bulk plot trial was carried out under SBS conditions. Data on four yield characters *viz.*, green, cured and bright leaf yields and grade index recorded and were subjected to statistical analysis separately for CBS and SBS conditions for individual seasons and on pooled basis for CBS conditions.

RESULTS AND DISCUSSION

Central black soils (CBS)

Analysis of data over two seasons (Table 1) as well as for individual seasons (data not shown) revealed that the advanced breeding lines tested against checks differed significantly for all the four yield characters viz., green, cured and bright leaf yields and grade index. Four of the five lines *viz.*, GH-9#1, GH-9#23, GH-9#25 and GH-10#35 recorded significantly higher green leaf yield ranging from 18103 to 19314 kg/ha, cured leaf yield ranging from 3016 to 3195 kg/ha, bright leaf yield ranging from 1371 to 1462 kg/ha and grade index ranging from 2552 to 2762 over the better check Siri (Table 1). Up to 19% improvement in green leaf yield, 21% increase in cured and bright leaf yield and 23% increment in grade index (Table 1) was observed over the best check Siri indicating that there is a positive scope for enhancing yield in FCV tobacco through breeding. Similar improvement in yield of FCV tobacco in Vertisols was also reported (Prasannasimha *Rao et al.,* 1995; Prasannasimha Rao and Satyanarayana, 1995). Season Variety interaction effects were not significant for all the four yield parameters indicating that improvement in the lines is mainly due to genetic factors.

Southern black soils (SBS)

All the six advanced breeding lines tested in SBS recorded significantly higher yield (green, cured and bright leaf yields and grade index) during 2009-10 (Table 2). Out of the six, four lines *viz.*, GH-10#35, GH9#25, GH-9#23 and GH9#22 recorded higher green leaf yield ranging from 21964 to 20982 kg/ha, higher cured leaf yield ranging from 3578 to 3507 kg/ha, higher bright leaf yield ranging from 1692 to 1594 kg/ha and higher grade index ranging from 3060 to 2996. The increase in green, cured and bright grade leaf yields and grade index were up to 37, 42, 53 and

Table 1: Performance of breeding lines (kg/ha) tested under CBS (Pooled for 2009-2011)

Entries	Green leaf	Cured leaf	Bright leaf	Grade index
GH-9#1	18715* (15)	3117* (18)	1443* (19)	2695* (20)
GH-9#23	18103* (12)	3016* (15)	1371* (13)	2552* (14)
GH-9#25	19296* (19)	3195* (21)	1403* (16)	2722* (21)
GH-10#35	19314* (19)	3180* (20)	1462* (21)	2762* (23)
GH-14#33	15953	2628	1199	2238
Hemadri (c)	15444	2502	1144	2048
VT-1158 (c)	14850	2420	1172	2068
Siri (c)	16220	2634	1213	2243
Grand mean	**17237**	**2837**	**1301**	**2416**
SEm±	**300**	**53**	**33**	**51**
CD (P=0.05)	**830**	**147**	**92**	**142**
CV (%)	**4.92**	**5.27**	**7.23**	**5.98**
Seasons				
2009-10	17458	2897	1321	2467
2010-2011	17015	2776	1281	2365
SEm±	**418**	**71**	**33**	**67**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**
CV (%)	**13.7**	**14.23**	**14.4**	**15.58**
Seasons Entries				
SEm±	**424**	**75**	**47**	**72**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**

*Significant at P=0.05, Figures in parenthesis indicate % increase over Siri

Table 2: Performance of breeding lines tested under SBS (kg/ha) during 2009-2010

Entries	Green leaf	Cured leaf	Bright leaf	Grade index
GH-9#1	17835* (12)	2904* (18)	1279* (16)	2415* (12)
GH-9#14	19375* (21)	3203* (27)	1493* (35)	2737* (27)
GH-9#22	20982* (31)	3507* (39)	1594* (44)	2996* (39)
GH-9#23	21607* (35)	3578* (42)	1616* (46)	3060* (42)
GH-9#25	21406* (34)	3560* (41)	1609* (45)	3018* (40)
GH-10#35	21964* (37)	3513* (39)	1692* (53)	3000* (39)
Hemadri (c)	16049	2587	1051	1937
VT-1158 (c)	14375	2339	989	1915
Siri (c)	15982	2518	1107	2150
SEm±	**287.0**	**68.7**	**37.9**	**50.9**
CD (P=0.05)	**839**	**201**	**111**	**149**
CV (%)	**3.05**	**4.47**	**8.49**	**13.95**

*Significant at P=0.05, Figures in parenthesis indicate % increase over Siri

42% over the check Siri respectively. The above lines have also performed well during 2010-11 with similar trends in yield improvement (Table 3) indicating that there is better scope for yield improvement in SBS conditions. Similar results were obtained by Prasannasimha Rao (1998).

Chemical quality

The chemical quality parameters like nicotine, reducing sugars and chlorides of the lines tested in both CBS and SBS conditions were within the acceptable range (Table 4). The present study indicated that there is positive scope for improvement in FCV tobacco yields under SBS and CBS through location specific breeding.

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Table 3: Performance of lines tested under SBS (kg/ha) during 2010-2011

Entries	Green leaf	Cured leaf	Bright leaf	Grade index
GH-9#1	16765 (6)	2701 (7)	1189 (3)	2294 (7)
GH-9#14	18213 (15)	2979 (18)	1388 (20)	2600 (21)
GH-9#22	19723 (25)	3262 (29)	1482 (29)	2846 (33)
GH-9#23	20311 (29)	3328 (32)	1503 (30)	2907 (36)
GH-9#25	20122 (27)	3311 (31)	1496 (30)	2867 (34)
GH-10#35	20646 (30)	3267 (29)	1574 (37)	2850 (33)
Hemadri (c)	15889	2574	1046	1840
VT-1158 (c)	14231	2327	984	1819
Siri (c)	15822	2524	1153	2143

Figures in parenthesis indicate % increase over Siri

Table 4: Chemical quality of selected advanced breeding lines

Entries	Nicotine (%)	Reducing sugars (%)	Chlorides (%)
GH-9#1	2.48	12.98	0.29
GH-9#22	2.48	13.61	0.23
GH-9#23	3.27	11.64	0.24
GH-9#25	3.28	8.25	0.21
GH-10#35	2.73	9.98	0.29
GH-14#33	2.91	10.15	0.27
Hemadri (c)	2.35	13.96	0.22
VT-1158 (c)	2.35	15.00	0.38
Siri (c)	2.90	13.72	0.28

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