Tobacco Research 39 (2) : 86-89, 2013

AGRONOMIC EVALUATION OF PROMISING FCV TOBACCO VARIETIES IN KARNATAKA LIGHT SOILS

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(Received on 24th November, 2011)

Field experiments were conducted to evolve suitable agronomic packages for promising pre-release wilt resistant FCV tobacco lines FCH 221 and FCH 222 during 2009 and 2010 crop seasons on red sandy loam soils of Karnataka Light Soils (KLS). The treatments consisted of 2 levels of spacing and 2 levels of topping in main treatments and 3 levels of nitrogen in sub-plots in a splitplot design with three replications. The results revealed that 100 x 55 cm spacing (18,181 plants/ha) was better than 100 x 60 cm spacing (16,666 plants/ha). Adopting 22 leaves topping increased cured leaf and top grade equivalent yield by 4.6 and 5.4%, respectively as compared to lower topping at 20 leaves in line FCH 221. The N application at 60 kg/ha was found optimum for maximizing both the cured leaf and top grade equivalent compared to 50 or 70 kg N/ha. Similarly the recommended spacing of 100 x 55 cm with 18,181 plants/ha was ideal for the line FCH 222. Even though there was no significant differences between the two levels of topping, 20 leaves topping was found advantageous as there was improvement in productivity (up to 8.1%) over 22 leaves topping, especially during the dry season. The application of N at 60 kg/ha was found to be optimum dose as the application of N beyond 60 kg/ha did not significantly increase the yield of cured leaf or top grade equivalent. The cured leaf quality parameters like nicotine, reducing sugars and chlorides were not affected by various cultural practices adopted in both the lines. Hence, adopting 100 x 55 cm spacing and 22 leaves topping with application of 60 kg N/ha (in 2 splits) for line FCH 221 and 100 x 55 cm spacing and topping at 20 leaves with N application of 60 kg/ha (in 2 splits) in line FCH 222 would be the ideal agronomic practices for maximizing both the cured leaf and top grade equivalent yield with desired quality parameters in these lines under KLS conditions.

INTRODUCTION

FCV tobacco is an important commercial crop grown under monsoonic climate in Karnataka Light Soils (KLS). Among the major production factors, optimum nutrition especially nitrogen, level of topping and the plant density play an important role for maximizing the productivity as well as the quality of this export oriented crop. The response of different genotypes/varieties to nitrogen and topping vary considerably due to genetic character, plant habit, growth pattern and the growing environment. The application of N greatly influences the crop growth, gas exchange parameters, specific leaf weight, chlorophyll content which in turn affect yield and quality of tobacco (Anuradha *et al.*, 2010). Krishna Reddy *et al.* (2006) reported that 120 kg N/ha was found optimum dose for the FCV variety Kanchan for getting higher yield with better quality in irrigated Alfisols of Andhra Pradesh whereas 60 kg N/ha recorded the highest yield and top grade equivalent in KST-27 grown on sandy loam soils in Shimoga conditions (Dinesh Kumar *et al.*, 2010). Giridhar *et al.* (1998) reported that 100 x 55 cm spacing and 50 kg N/ha showed significantly higher cured leaf yield and top grade equivalent in both NLS-1 and NLS-4 on sandy loam soils of KLS. At present Kanchan is the major variety grown in all the FCV tobacco growing regions of Karnataka. Recently, *Fusarium* wilt, a soil borne fungal diseases is becoming a major problem in the wilt affected endemic zone of KLS. In this direction, two promising wilt resistant varieties *viz.*, FCH 221 and FCH 222 were identified and evaluated for the control of *Fusariunm* wilt disease under KLS conditions. However the optimum spacing, plant population, nitrogen requirement and the level of topping need to be worked out for optimizing the productivity as well as the quality of these genotypes recommended for wilt endemic regions. Hence, attempts were made to evaluate the optimum agronomic input requirements for optimizing the cured leaf productivity, top grade equivalent and sustaining the quality for these varieties under KLS conditions.

MATERIALS AND METHODS

Field experiments were conducted with two promising wilt resistant promissing breeding lines FC 221 and FCH 222 for two seasons during 2009 and 2010 at CTRI research farm, Hunsur, Mysore district, Karnataka in red sandy loam soils. The experiment consisted of two levels of spacing (100 X 55 cm and 100 x 60 cm), two levels of topping (20 and 22 leaves) and three levels of N (50, 60 and 70 kg/ha) in a split plot design. While the entire recommended dose of phosphorus (40 kg/ ha) was applied as basal dose at 10 days after transplanting (DAT), the N (as per the treatments) along with the recommended K (120 kg/ha) was applied in 2 equal spilts at 10 and 30 DAT. Bud stage topping was done at 20 and 22 leaves as per the treatments. The experimental soils are slightly acidic to neutral in soil reaction (pH 6.4 - 7.0), low in organic carbon (0.38%) and medium in available P_2O_5 (22 kg/ha) and slightly high in available K_2O (280 kg/ha) status. The plot size was 33 m^2 in case of 100 x 55 cm and 36 m^2 in case of 100 x 60 cm spacing. The experiments were conducted separately for each of the variety under the same growing environments. The various yield parameters like green leaf yield, cured leaf yield and top grade equivalent were recorded as per the treatments. The cured leaf quality characteristics like nicotine, reducing sugars and chlorides were analyzed and the data were statistically analyzed for interpretation of the results. The optimum input packages for these varieties were worked out.

RESULTS AND DISCUSSION

The data on the yield parameter as influenced by the levels of spacing, toping and nitrogen doses were given in Table1 and Table 2 for FCH 221 and FCH 222, respectively. Results of the pooled data revealed that the levels of spacing adopted did not significantly influence the various yield parameters in any of the lines. The green leaf yield was found to be significantly higher at 100 x 60 cm spacing as compared to 100 x 55 cm spacing in line FCH 221. However the same thing was not reflected in the cured leaf productivity and top grade equivalent. It may be inferred that regular spacing of 100 x 55 cm will be sufficient enough for optimizing the yield parameters in both these new cultivars.

The levels of topping adopted also did not significantly influence the various yield parameters. While topping at 22 leaves recorded significantly higher green leaf yield and the maximum cured leaf yield and top grade equivalent in FCH 221 whereas productivity parameters were found to be higher at lower topping at 20 leaves in FCH 222. It may be noted that while the line FCH 221 is having a slightly narrower leaf habit, the line FCH 222 has relatively broader leaf type responding favourably to the lower topping level. The 20 leaves topping in line FCH 222 was found to be more advantageous especially during the drought year or below normal rainfall year as the productivity gain was seen up to 8.2%.

The level of N doses did not significantly influence the productivity levels of cured leaf and top grade equivalent in FCH 221, whereas the productivity reached maximum at 60 kg/ha. In case of FCH 222, to application of 60 kg N/ha was significantly superior to 50 kg N/ha in terms of both CLY and TGE. Even though the response was seen up to 70 kg N/ha in this line, differences between 60 kg N and 70 kg N/ha were not significant indicating that 60 kg N/ha would be the optimum dose. Among the levels of N, 60 kg N produced significantly higher cured leaf yield over 50 kg N/ha and there was no further increase in the yield with 70 kg N/ha in the variety Kanchan under KLS conditions (Anonymous, 2002). Nutrient uptake studies in FCV tobaccos under KLS conditions revealed that FCV tobacco crop removes as high as 64.5 kg N, 18 kg P_2O_5 and 96 kg K_2O/ ha (Krishnamurthy *et al.*, 2006). Considering the present soil type, growing environment and the productivity levels it may be inferred that application of 60 kg N/ha would be sufficient to achieve the optimum productivity and top grade leaf production in both FCH 221 and FCH 222 lines.

The cured leaf quality parameters were not much influenced by the various agronomic treatments adopted. However, lower topping at 20 leaves stage and application of higher level of N at 70 kg/ha resulted in comparatively higher nicotine content in both X and L positions of leaves in both the lines. The Nicotine content increased progressively and reducing sugars decreased with increase in the level of nitrogen doses from 50 kg

Table 1: Effect of spacing, topping and nitrogen levels on yield parameters (kg/ha) of promising FCV tobacco line FCH 221 (2009 and 2010)

Treatments	Green leaf	Cured leaf	Top grade equivalent
Spacing			
100 x 55 cm	10739	1645	1151
100 x 60 cm	10165	1596	1142
SEm±	**171.4**	**30.6**	**25.9**
CD (P=0.05)	**561.9**	**NS**	**NS**
Topping levels			
20 leaves	9977	1584	1117
22 leaves	10687	1658	1171
SEm±	**141.4**	**30.6**	**34.0**
CD (P=0.05)	**475.1**	**NS**	**NS**
N levels			
50 kg/ha	10024	1560	1105
60 kg/ha	10621	1650	1170
70 kg/ha	10351	1656	1166
SEm±	**209.9**	**37.5**	**31.5**
CD (P=0.05)	**NS**	**NS**	**NS**
CV (%)	**9.9**	**11.5**	**13.5**

Table 2: Effect of spacing, topping and nitrogen levels on yield parameters (kg/ha) of promising FCV tobacco line FCH 222 (2009 and 2010)

Treatments	Green leaf	Cured leaf	Top grade equivalent
Spacing			
100 x 55 cm	11093	1560	1066
100 x 60 cm	10660	1501	1033
SEm±	**189.5**	**29.6**	**22.8**
CD (P=0.05)	**NS**	**NS**	**NS**
Topping levels			
20 leaves	10895	1562	1069
22 leaves	10858	1499	1031
SEm±	**189.5**	**29.6**	**22.8**
CD (P=0.05)	**NS**	**NS**	**NS**
N levels			
50 kg/ha	10243	1454	998
60 kg/ha	10955	1554	1070
70 kg/ha	11430	1584	1081
SEm±	**232.1**	**36.3**	**29.9**
CD (P=0.05)	**643.2**	**101.7**	**NS**
CV (%)	**10.4**	**11.6**	**13.0**

Table 3: Effect of spacing, topping and nitrogen levels on cured leaf quality parameters (%)

Treatments	FCH 221						FCH 222					
	Nicotine		Reducing sugars		Chlorides		Nicotine		Reducing sugars		Chlorides	
	X	L	X	L	X	L	X	L	X	L	X	L
Spacing												
100x55 cm	1.11	1.38	19.00	16.10	0.19	0.22	1.16	1.33	15.70	14.95	0.18	0.19
100x60 cm	1.13	1.44	16.82	16.78	0.19	0.22	1.16	1.37	13.80	15.08	0.18	0.20
Topping												
20 leaves	1.08	1.41	18.38	16.65	0.19	0.19	1.43	1.43	15.07	15.62	0.19	0.21
22 leaves	1.09	1.40	18.35	16.13	0.23	0.23	1.34	1.34	14.52	14.47	0.17	0.20
N levels												
50 kg/ha	1.11	1.27	18.80	17.23	0.25	0.25	1.25	1.25	15.33	15.50	0.17	0.18
60 kg/ha	1.14	1.45	17.36	16.86	0.21	0.21	1.43	1.43	14.67	15.40	0.18	0.20
70 kg/ha	1.16	1.57	17.61	15.52	0.22	0.22	1.49	1.49	14.34	14.02	0.09	0.18

to 70 kg N/ha. Chlorides were not altered due to the treatments. In general cured leaf quality characteristics were in the normal optimum range in both the lines.

Based on the results of the present investigations, it can be concluded that adopting recommended spacing of 100 x 55 cm (with a population of 18,181 plants/ha) with topping at 22 leaves and application of 60 kg N/ha for line FCH 221 and 100 x 55 cm spacing with 20 leaves topping and application for 60 kg N/ha in the case of FCH 222 would be ideal agronomic practice for achieving the optimum productivity levels of both cured leaf and top grade leaf production as well as sustaining cured leaf quality in the promising wilt resistant lines FCH 221 and FCH 222 under KLS conditions.

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