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AGROTECHNIQUES TO IMPROVE THE SEED AND OIL YIELD OF CHEWING TOBACCO GROWN IN TAMIL NADU

M. KUMARESAN, V. KRISHNAMURTHY, P. HARISHU KUMAR, A.V.S.R. SWAMY AND R. ATHINARAYANAN

Central Tobacco Research Institute Research Station, Vedasandur – 624 710

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Field experiments were conducted at CTRI Research Station, Vedasandur to study the effect of spacing and nitrogen on the seed and oil yield of chewing tobacco variety Abirami with four spacing levels viz., 75 x 75 cm, 75 x 60 cm, 75 x 40 cm and 75 x 30 cm under three levels of nitrogen viz., 75,100 and 125 kg/ha. Plant height, yield attributes , seed and oil yield of chewing tobacco significantly increased at the spacing 75 x 40 cm over the spacing 75 x 75 cm. The seed and oil yield recorded were 905 and 341 kg/ha, respectively. Higher dose of nitrogen, 125 kg/ha is essential for maximizing the seed and oil yield.

INTRODUCTION

It is estimated that about 1200 to 1500 tonnes of tobacco seed oil is expelled annually and exported from India to other countries for utilization in paint industry (Deo Singh and Narasimha Rao, 2005). Extraction of oil from tobacco seed is one of the diversified use of tobacco and with the increasing importance of research on alternative uses of tobacco, the tobacco seed oil gained importance. Studies revealed that tobacco seed contains about 33.6 – 39.6% of oil (Hamid *et al.,* 1982) and the nutritional value of tobacco seed oil is also better than ground nut and cotton seed oils and comparable to safflower oil. Refined tobacco seed oil is used as an edible oil in European countries (Talaquani *et al.*, 1986) The present study was taken up to increase the seed and oil yield of chewing tobacco by changing the spacing and nitrogen levels

MATERIALS AND METHODS

A field experiment was conducted at Central Tobacco Research Institute Research Station, Vedasandur, Tamil Nadu during the *rabi* 2005-06 and 2006-07 to study the effect of spacing and nitrogen on the seed and oil yield of chewing tobacco variety, Abirami. The crop was raised with four level of spacings viz. 75 x 75 cm, 75 x 60 cm, 75 x 40 cm and 75 x 30 cm under three levels of nitrogen viz., 75, 100 and 125 kg/ha . The experiment was conduced in a factorial randomized block design with three replications. The soil of the experimental site was gravelly with pH of 8.3, low in available N (210 kg/ha), available P (6.5 kg/ha) and medium in available K (250 kg/ha). Phosphorus @ 100 kg/ha in the form of super phosphate (625 kg/ha) mixed with 2.5 t/ha of sieved farm yard manure was spot-applied. Potassium 100 kg K_2O/ha as KCl was applied at 45 and 60 days after planting (DAP). Nitrogen was top dressed as per the treatments in two equal splits as ammonium sulphate and urea at 45 and 60 DAP, respectively. The crop was primed at 100, 110 and 120 DAP. The panicles were harvested and dried in sun light. After drying, the capsules were threshed, winnowed and seeds were separated manually, cleaned and dried. Seed yield was recorded at 6-8% moisture. The oil per cent was estimated by nuclear magnetic resonance (NMR) method. The percentage of oil was multiplied with the seed yield to get the oil yield.

RESULTS AND DISCUSSION

Plant height and yield attributes

Spacing significantly influenced the plant height, length and width of panicle and number of capsules (Table 1). Plant height was significantly higher with the spacing 75 x 40 cm over the wider spacing 75 x 75 cm during 2005-06. During 2006-07, the plant height was higher at 75 x 60 cm over wider spacing of 75 x 75 cm. The pooled data on plant height revealed that the spacing 75 x 40 cm recorded a higher plant height over the spacing 75 x 75 cm. Panicle length was significantly higher with 75 x 40 cm over 75 x 75 cm during 2005-06.Whereas during 2006-07 and in pooled data the panicle length was higher with 75 x 60 cm over the spacing 75 x 75 cm. The panicle width during both the years as well as

Table 1: Growth and yield attributes as influenced by spacing and N.

Treatments	Plant height (cm)			Panicle length (cm)			Panicle width (cm)			No. of capsules/plant		
	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled
Spacing (cm)												
75 x 75	164	132	148	33.3	30.9	32.1	21.6	24.4	23.0	623	347	485
75 x 60	178	135	157	31.4	31.5	31.5	22.9	24.8	23.8	571	331	451
75 x 40	181	134	157	32.4	30.3	31.4	21.4	24.1	22.7	429	303	366
75 x 30	172	135	154	31.8	31.1	31.4	21.6	23.2	22.4	350	302	326
SEmØ	**2.72**	**0.62**	**1.58**	**0.04**	**0.08**	**0.62**	**0.10**	**0.06**	**0.23**	**30.3**	**14.7**	**0.03**
CD (P=0.05)	**7.99**	**1.90**	**4.39**	**0.18**	**0.26**	**NS**	**0.32**	**0.19**	**0.65**	**88.7**	**NS**	**0.09**
N levels(kg /ha)												
75	173	131	152	31.0	30.9	31.0	21.3	23.7	22.5	477	327	402
100	175	133	154	31.0	30.5	30.7	21.6	24.4	22.9	497	313	405
125	174	137	156	32.5	30.8	31.6	22.7	24.2	23.5	506	322	414
SEmØ	**2.35**	**1.39**	**1.37**	**0.81**	**0.01**	**0.53**	**0.60**	**0.40**	**0.20**	**26.2**	**2.7**	**0.03**
CD (p=0.05)	**NS**	**4.10**	**NS**	**NS**	**0.04**	**NS**	**1.10**	**NS**	**0.56**	**NS**	**8.1**	**0.07**
CV(%)	**4.68**	**12.2**	**4.46**	**8.93**	**7.84**	**19.5**	**15.2**	**5.77**	**15.3**	**18.4**	**13.7**	**0.03**

in pooled data was higher with 75 x 60 cm over the spacing 75 x 75 cm. Higher number of capsules were recorded with the wider spacing 75 x 75 cm over the closer spacing in both the years as well as in the pooled data. As the crop received sufficient sunlight and nutrients at wider spacing the number of capsules were more. Levels of spacing did not influence the length and width of panicle.

Nitrogen at 125 kg/ha significantly increased the plant height over 75 kg N /ha during 2006-07. The pooled data showed increased panicle length with 125 kg N/ha over 75 kg N/ ha. The panicle width was significantly higher with 125 Kg N/ha over 75 kg N/ha. The number of capsules significantly increased with 125 kg N/ha over 75 kg N/ha. (Table 1). As the crop received sufficient quantity of N, the plant height and yield attributes were more. Lower plant height and yield attributes were recorded with 75 kg N/ ha. The capsule size viz., length and width are not significantly influenced by N levels. The size of capsule however increased with 125 kg N/ha (Table 2).

Seed and oil yield

Spacing significantly influenced the seed yield during both the years as well as in the pooled data. Closer spacing 75 x 40 cm significantly increased the seed yield (1078 kg/ha) by 29.7% over 75 x 75 cm spacing during 2005-06. Whereas during 2006 – 07, higher (20%) seed yield (774 kg/ha) was recorded with 75 x 30 cm over 75 x 75 cm spacing . The pooled data revealed that the spacing 75 x 40 cm recorded higher seed yield of 905 Kg/ha. In Tamil Nadu, the tobacco hybrids recorded a seed yield of more than 2000 kg/ha over the varieties (Swamy *et al.,* 2009). The increase in plant population in the closer spacing resulted in increased seed yield. Kumaresan *et al.* (2008) reported similar findings in the leaf yield of GJH-108 hybrid tobacco under Vedasandur conditions. The wider spacing, 75 x 75 cm recorded a lower seed yield which could be attributed to the lower plant population.

The oil yield was significantly higher with spacing 75 x 40 cm as compared to spacing 75 x 75 cm. The increase in oil yield was 26 % over 75 x 75 cm spacing during 2005 – 06. Whereas during 2006-07, the oil yield was higher with the spacing 75 x 60 cm over 75 x 75 cm. The increase in oil yield was 16 % over the spacing 75 x 75 cm. The pooled data showed an increased oil yield with 75 x 40 cm. The oil yield was 341 kg/ha. The increase in seed yield and per cent of oil in the seed, resulted in increased oil yield. Rangaiah and Nagesh (2009) found that the oil yield of tobacco was significantly associated with seed yield of tobacco. Patel *et al.* (1998) recorded an oil yield of 432.9 kg/ha in chewing tobacco cv.A-145 under Gujarat conditions.

Nitrogen did not influence the seed and oil yield in both the years as well as in the pooled

Table 2: Seed yield attributes, seed yield and oil yield of chewing tobacco as influenced by spacing and N.

Treatments	Capsule length (cm)			Capsule width (cm)			Seed yield (kg/ha)			Oil yield (kg/ha)		
	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled	2005-06	2006-07	Pooled
Spacing (cm)												
75 x 75	1.71	1.81	1.76	0.87	0.98	0.92	831	644	737	324	239	281
75 x 60	1.71	1.87	1.79	0.90	1.00	0.95	935	770	853	341	277	309
75 x 40	1.59	1.79	1.69	0.84	0.99	0.91	1078	730	905	409	272	341
75 x 30	1.66	1.82	1.72	0.84	0.95	0.90	1005	774	890	376	277	327
SEmØ	**0.05**	**0.04**	**0.03**	**0.04**	**0.02**	**0.02**	**38.3**	**26.7**	**23.4**	**21.1**	**11.2**	**12.0**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**112.5**	**78.3**	**64.7**	**70.6**	**37.4**	**36.8**
N levels(kg/ha)												
75	1.65	1.78	1.72	0.88	0.95	0.92	978	724	851	371	262	217
100	1.64	1.84	1.74	0.84	099	0.92	941	725	833	352	267	310
125	1.68	1.86	1.77	0.87	0.99	0.93	968	740	854	365	270	317
SEmØ	**0.05**	**0.03**	**0.03**	**0.03**	**0.02**	**0.02**	**33.2**	**23.1**	**20.2**	**11.5**	**8.74**	**16.9**
CD (P=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
CV(%)	**9.47**	**6.24**	**7.88**	**12.6**	**7.60**	**10.1**	**11.9**	**10.9**	**11.3**	**11.0**	**11.4**	**11.2**

data. However, the yield of seed and oil were higher with 125 kg N/ha. It was reported that for chewing tobacco, 125 kg N/ha is essential for higher leaf yield (Anonymous, 2011).

From the results of the two year study, it is concluded that the spacing 75 x 40 cm with 125 kg N/ha would be optimum for increased plant height, yield attributes, seed and oil yield of chewing tobacco tobacco grown in Tamil Nadu.

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