

EFFECT OF TOPPING AT DIFFERENT GROWTH STAGES ON THE YIELD AND QUALITY OF FCV TOBACCO GROWN IN NORTHERN LIGHT SOILS OF ANDHRA PRADESH

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SUMMARY

Topping and desuckering significantly influenced yield and quality of fcv tobacco grown in NLS area of Andhra Pradesh. Topping at different time intervals starting from the appearance of flower bud to the full bloom stage resulted in increased yields as compared to no topping. Topping at button and bud stages gave significantly higher yield as compared to other stages. No topping gave lowest yield followed by topping at full bloom. All the three yield characters green leaf yield cured leaf yield and grade index were affected by the time of topping. Area of the top leaf and specific leaf weight measured at the time of harvest was higher with topping up to first flower opening as compared to full bloom and no topping. Cured leaf thickness was higher with initial three stages of topping as compared to no topping but not with topping at full bloom. Leaf chemical quality parameters nicotine and reducing sugars were affected by the time of topping. Topping at 16 and 18 leaves gave significantly higher yield as compared to 14 leaves and no topping. Top leaf area was highest with 14 leaves topping as compared to 16 and 18 leaves topping and no topping. Specific leaf weight and cured leaf thickness did not change with the number of leaves on the plant. It is concluded that topping at elongated bud stage with 16 leaves produced higher yield and better quality in fcv tobacco in northern light soil areas of Andhra Pradesh.

Key words: Cured leaf yield, fcv tobacco, nicotine, reducing sugars, topping

INTRODUCTION

Topping, the practice of removing flower head and the arrest of subsequent growth of axillary buds in few tobacco cultivation results in higher yield and quality. Pal and Kadam (1954) and Bangarayya *et al.* (1982) used edible and non edible oils respectively for control of suckers. Topping at the optimum height and time of floral development with following effective sucker control (arrest of axillary bud growth results in yield increase ranging from fifteen to thirty per cent (Woltz 1955 and Chaplain 1964). Marshal and Seltmann (1964) defined four stages of floral development in tobacco and with

delay in topping from the initial button stage there was increasing loss in yield. Elliot (1966) also reported higher yields with early topping as compared to late topping. In northern light soils (NLS) of Andhra Pradesh exportable fcv tobacco is grown under irrigated conditions and under these conditions yield response to topping was observed. For improving yield and quality topping and sucker control is essential practice but the time and schedule has to be developed for maximizing the benefits of topping. Krishnamurthy (1959) reported increased yield on topping virginia tobacco varieties. With this aim a study was conducted to find out the optimum time and height of topping for realizing maximum yields.

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MATERIALS AND METHODS

Uniform seedlings of fcv tobacco variety 16/103 were planted on 2nd November and 6th November in 1986 and 1987 crop seasons in northern light soil farm of CTRL. Plantings were done in two blocks in randomized block design with spacing of 1.0 meter between rows and 0.6 meters within the rows. Fertilizers, di-ammonium phosphate (DAP), calcium ammonium nitrate (CAN) and potassium sulphate were applied in the ratio of 80:60:80 (NPK) as split application in plant hole. Full dose of phosphorus and half dose of nitrogen and potassium were applied one week after planting and the balance of nitrogen and potassium were applied 15 days after first application. Irrigation was given as per recommended schedule. 55 days after planting floral head started appearing and we call this as button stage. Between the initial button stage and final full bloom stage there appears another two stages, elongated bud stage and first flower opening with an interval of 25 days between initial button and final full bloom stage. In one block, time of topping involving four stages along with no topping was tested. Topping was done in each plot when 50 per cent of plants were at the stage specified leaving uniformly 18 leaves on the plant in all the plots. Remaining 50 per cent of plants were topped as soon as they reached specified topping stage. Topping followed with the application of suckericide, Decanol, at 4 per cent concentration @ 8ml/plant was applied with a dropping bottle in the top three leaf axiles so that the solution drained down the stem and covered all the leaf axiles. Topping at the button stage was to be done with little extra care, as at this point of time the top leaves were very tender and prone to damage. Axillary buds longer than one to two inches were removed with hand before the application of suckericide in all the treatment plots. 10 days after topping and application of the suckericide the suckers which remained on the plants in all the plots were removed manually. Harvesting and curing was carried out as per the recommended schedule. Cured leaf samples from middle leaf position were collected for chemical analysis and chemical constituents nicotine, sugars (Harvey *et al.* 1969) and chlorides (Hanumantha rao *et al.* 1980) were estimated. In another block, topping at 14, 16 and 18 leaves were compared with no topping in a randomized block design with spacing of 1.0 x 0.6 m. All other operations were carried out as given in block one.

The data was analysed statistically (Panse and Sukhatme 1967).

RESULTS AND DISCUSSION

Topping and suckering influences yield and quality in fcv tobacco. Topping at optimum height and time of floral development increase yields in tobacco (Elliot 1966, Chaplin *et al.*, 1964 and Marshall and Selmann (1964). Time of topping had a significant effect on yield, area of top leaf, specific leaf weight (SLW), cured leaf thickness, nicotine and reducing sugar content of the cured leaf. Topping at button stage and bud stage resulted in significantly high green leaf yield, cured leaf yield and grade index as compared to topping at first flower opening, full bloom and no topping (Table 1). Lowest yield was recorded with no topping followed by topping at full bloom and first flower opening. Topping at first flower opening though gave lower yield as compared to button and bud stage, but it was significantly higher as compared to topping at full bloom and no topping. Delay in topping, from bud stage onwards, resulted in significantly lower yield. In tobacco, axillary buds and inflorescence interfere with growth and development of leaves and the removal of competing sinks, the inflorescence and suckers, results in accelerated growth of the leaves. This results in accumulation of higher dry matter in leaves and consequently higher yield. Under these conditions early topping avoids wastage of dry matter accumulation in inflorescence and suckers. Delay in one day topping from button or bud stage onwards until the full bloom stage caused 20 kg loss per day in cured leaf yield per hectare. Top leaf area was higher when topping was done on or before first flower opening but further delay in topping reduced the leaf area significantly (Fig. 1). Leaf weight per unit area or SLW was higher with topping on or before first flower opening stage and further delay reduced it. The effect of season was found to be significant on all the yield characters but the interaction between seasons and treatments was not significant. Height and topping was reported to influence yield and quality in fcv tobacco (Elliot 1966). Topping at 18 and 16 leaves gave higher green leaf yield and cured leaf yield as compared to 14 leaves topping and no topping (Table 3). Grade index was higher and at par with each other at three heights of topping as compared to no topping. Top leaf area and

Table 1. Effect of time of topping on yield characters (kg/ha) of fcv tobacco

Time of topping	Green leaf yield			Cured leaf yield			Grade index		
	Season 1	Season 2	Pooled	Season 1	Season 2	Pooled	Season 1	Season 2	Pooled
Button stage	16500	15750	16125	2120	1920	2020	1500	1430	1465
Bud stage	16000	14925	15462	2050	1835	1942	1500	1345	1422
1 st flower opening	15175	14050	14612	1860	1720	1790	1450	1282	1366
Full bloom	14137	12900	13519	1665	1580	1622	1045	975	1010
No topping	11185	9500	10342	1435	1190	1312	885	820	852
SEm±	393	244	231	54	27	30	29	20	17
CD (0.05)	1211	753	675	167	83	89	88	60	51
CV (%)	5.38	3.64	4.67	5.95	3.27	4.95	4.48	3.34	4.0
Seasons	1		14599			1826			1276
	2		13425			1649			1170
SEm±			170			16			12
CD (0.05)			5.88			57			42
CV (%)			5.42			4.22			4.55
Season X Treatment									
SEm±			327			43			24
CD (0.05)			NS			NS			NS

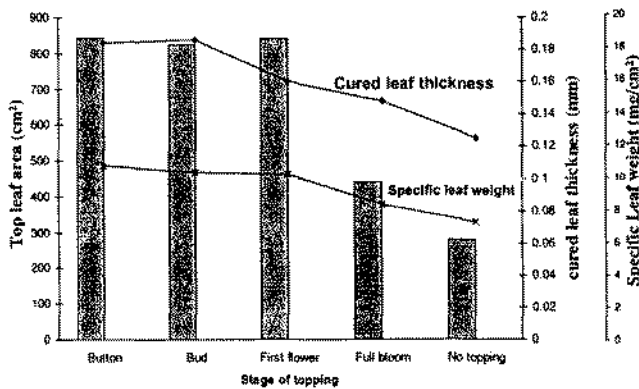


Fig. 1. Effect of time of topping on leaf growth and development

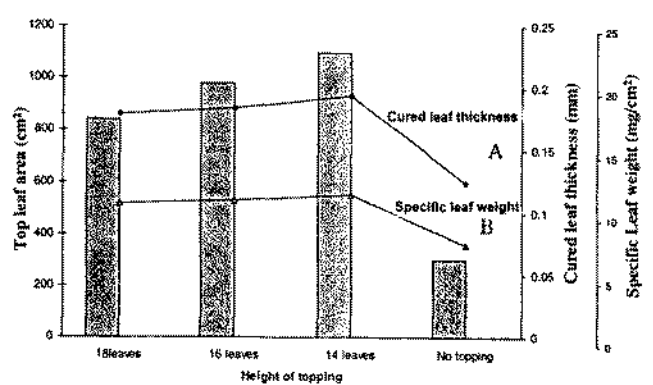


Fig. 2. Effect of height of topping on leaf growth and development

SLW was higher with topping at 14 leaves as compared to 16 and 18 leaves topping and no topping (Fig. 2). Increasing number of leaves in topped treatments decreased top leaf area significantly but the SLW was at par with topping at 14, 16 and 18 leaves. Lower number of leaves per plant (14 leaves) gave higher leaf area and leaf thickness but this could not compensate for the lower leaf number per

plant. Higher leaf number (16 and 18 leaves/plant) gave higher yield though top leaf area and SLW were lower. Under untopped conditions leaf number was much higher but leaves were thinner and smaller as less dry matter accumulated in these leaves because of competition from the inflorescence and suckers.

EFFECT OF TOPPING ON YIELD OF TOBACCO

Leaf chemical quality is an important parameter for fcv tobacco usage. Nicotine and reducing sugar content of the leaf determines the leaf chemical quality. Cured leaf nicotine content was higher with early topping and with delay in topping the nicotine content decreased (Table 2). Topping at full bloom and no topping resulted in lower per cent nicotine and higher per cent reducing sugars in the leaf as compared to topping at button or bud stage or first flower opening. Leaf chlorides were not affected by the time of topping. Leaf number after topping significantly influenced the leaf nicotine and reducing sugar content. Lower the topping higher the nicotine and lower the reducing sugar content (Table 3). No topping gave lower nicotine and sugar content as compared to topping at 14,

Table 2. Effect of time of topping on leaf chemical quality parameters

Time of topping	Nicotine (%)		Reducing sugars (%)			Chlorides (%)			
	Season 1	Season 2	Pooled	Season 1	Season 2	Pooled	Season 1	Season 2	Pooled
Button stage	3.23	3.06	3.14	10.91	10.92	10.91	1.24	1.23	1.23
Bud stage	3.17	2.99	3.08	10.17	10.73	10.45	1.27	1.09	1.18
1 st flower opening	3.23	2.94	3.09	10.31	11.78	11.05	1.08	1.09	1.09
Full bloom	2.78	2.46	2.62	10.39	12.07	11.23	1.10	1.06	1.08
No topping	2.60	2.22	2.41	12.78	14.31	13.55	1.00	1.17	1.09
SEm±	0.10	0.10	0.07	0.68	0.72	0.49	0.11	0.10	0.07
CD (0.05)	0.31	0.30	0.20	NS	2.35	1.48	NS	NS	NS
CV (%)	5.76	5.79	5.68	10.55	10.44	10.50	16.19	14.88	15.0
Seasons	1		3.00			11.11			1.14
	2		2.73			11.96			1.13
SEm±			0.02			0.12			0.04
CD (0.05)			0.06			0.47			NS
CV (%)			2.21			3.98			13.0
Season X Treatment									
SEm±			0.09			0.70			0.10
CD (0.05)			NS			NS			NS

Table 3. Effect of height of topping on yield and chemical quality of fcv tobacco

Treatment	Yield character (Kg/ha)			Quality parameter (%)		
	Green leaf	Cured leaf	Grade index	Nicotine	Reducing Sugars	Chlorides
18 leaves	16500	2120	1512	3.23	10.24	1.17
16 leaves	16800	2185	1540	3.33	10.60	1.00
14 leaves	15875	1965	1484	3.65	8.81	1.18
No topping (26 leaves)	11187	1443	885	2.60	12.79	1.05
SEm±	173	27	16	0.06	0.47	0.07
CD (0.05)	532	83	48	0.20	1.50	NS
CV (%)	2.6	3.1	2.6	3.9	8.9	12.7

16 or 18 leaves height. It is concluded that topping at elongated bud stage with 16 leaves produces higher yield and better and better quality in fev tobacco in northern light soil areas of Andhra Pradesh.

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