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Effect of time of sowing and topping on seed yield of roselle (*Hibiscus sabdariffa*)

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ABSTRACT

A field experiment was conducted for 2 consecutive rainy (*kharif*) seasons (1990 and 1991) on Alfisols of Amadalavalasa, to investigate the effect of time of sowing and topping on seed yield of roselle (*Hibiscus sabdariffa* L). Early sowing during third week of June improved both yields and monetary returns. Topping at 60 days after sowing influenced various yield attributes, resulting in 11.9% higher yield than no topping. However when both seed and fibre yields were considered, topping did not appear profitable.

Roselle (*Hibiscus sabdariffa* L) is mostly cultivated for fibre purpose as a substitute of jute. In recent years, it has been proved that the crop can be allowed up to seed-setting stage and the sticks after seed collection can be utilized for pulp production (Appa Rao, 1985). Its seed contains 18–20% oil, which can directly be used in soaps and other industries. The cake obtained after oil extraction forms a good source of cattle and poultry feed.

The productive efficiency of a crop though depends on its genetic potential, its yield could be improved to a perceptible magnitude through suitable agronomic practices. Keeping this in view, an attempt was made to improve the seed yield by manipulating the sowing time and growth habit of the crop.

MATERIALS AND METHODS

A field trial was conducted for 2 consecutive rainy (*kharif*) seasons (1990 and 1991) at Agricultural Research Station, Amadalavalasa. The experimental site was an Alfisol, slightly acidic in reaction (pH 6.4), low in available nitrogen (0.32% organic carbon) and medium in available phosphorus (12.5 kg P_2O_5/ha) and potassium (250 kg K_2O/ha).

The treatments consisting of 2 dates of sowing (third week of June and first week of July) and topping at 2 stages (50 and 60 days after sowing) along with no topping as the control, were laid out in randomized block design and raplicated thrice. The cv. 'AMV 4' was sown as per the treatment by broadcasting the seed @ 12.5 kg/ha. The crop was supplied with 15 kg N/ha, 20 kg P_2O_5/ha and 20 kg K_2O/ha at sowing and 10 kg N/ha was top-dressed at first weeding (20–25 days after sowing). Topping at scheduled crop age was done just by pinching off the tip of the main axis

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manually. The crop was harvested at seed maturity in first week of January, pods were threshed and seed yield recorded. The sticks after seed collection were retted in a tank, fibre was extracted washed, dried thoroughly and fibre yield was expressed in kg/ha.

RESULTS AND DISCUSSION

Effect of time of sowing

Yield attributes: Different yield determining factors were significantly influenced by time of sowing. The crop sown in third week of June grew significantly taller, with relatively more basal stem girth. Early-sown crop produced higher number of branches/plant with significantly higher number of capsules. Test weight did not vary considerably with change in sowing time (Table 1).

Yield: Seed and fibre yields differed significantly due to time of sowing. Early-sown crop gave 57 and 80 kg extra seed yield compared with late-sown crop in first and second year respectively (Table 2). On an average, the seed yield increased by 13.5% with advancing the sowing time by a fortnight. Relatively more number of capsules with sound mature seeds owing to production of more branches might have contributed for higher seed yield (Thakuria and Sharma, 1991).

Similar to seed yield, fibre yield also increased significantly due to early sowing. However, the magnitude of increase in fibre yield was much higher than that of seed yield. Sowing in third week of June enhanced the fibre yield by 20 and 32.5% during 1990 and 1991 respectively. Fibre yield is directly correlated with plant height and basal stem girth (Sasmal and Chakraborthy, 1978). An increase in these parameters due to early sowing resulted in significantly higher yield (Table 2).

Effect of topping

Yield attributes: Topping of the main axis exerted significant influence on various yield attributes. Topping reduced the plant height and base diameter significantly over no topping on account of branching,

Table 1. Yield attributes of roselle as influenced by time of sowing and topping

Treatment	Plant height (cm)		Base diameter (cm)		Branches/ plant*		Capsules/ plant		1,000-seed weight (g)	
	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
Sowing time										
III week of June	275.9	270.5	1.11	1.07	1.39	1.37	9.67	6.08	21.7	20.64
I week of July	242.1	238.2	1.15	1.10	1.35	1.46	8.53	4.70	21.4	20.80
CD (P = 0.05)	5.5	5.7	NS	NS	0.03	0.05	0.78	0.48	NS	NS
Time of topping										
50 DAS	247.4	244.4	1.11	1.08	1.70	1.65	9.31	5.45	21.4	20.50
60 DAS	248.2	243.3	1.13	1.09	1.70	1.63	9.86	5.40	21.2	20.60
No topping (control)	281.5	275.4	1.15	1.09	0.71	0.71	8.11	5.00	21.9	21.40
CD (P = 0.05)	6.9	8.1	NS	NS	0.04	0.08	0.96	NS	NS	NS
CV (%)	12.5	14.0	9.0	8.7	2.50	5.15	9.90	12.04	2.3	2.40

DAS, Days after sowing

* Original data were transformed into $\sqrt{X + 0.5}$ and analysed statistically

Table 2. Effect of time of sowing and topping on seed and fibre yields in roselle

Treatment	Seed yield (kg/ha)			Fibre yield (kg/ha)		
	1990	1991	Mean	1990	1991	Mean
Sowing time						
III week of June	608	549	579	2,202	1,923	2,063
I week of July	551	469	510	1,834	1,451	1,643
CD (P = 0.05)	26.1	26.0		189	143	
Time of topping						
50 DAS	591	502	547	1,851	1,569	1,710
60 DAS	607	541	574	1,912	1,632	1,772
No topping (control)	542	484	513	2,291	1,861	2,076
CD (P = 0.05)	32.0	37.0		231	202	
CV (%)	5.2	6.9		10.7	11.5	

DAS, Days after sowing

Table 3. Gross monetary returns and net profit as influenced by time of sowing and topping in roselle

Treatment	Total gross returns (Rs/ha)			Net profit (Rs/ha)		
	1990	1991	Mean	1990	1991	Mean
Sowing time						
III week of June	14,891	13,177	14,035	10,811	9,097	9,954
I week of July	12,842	10,491	11,667	8,762	6,411	7,587
CD (P = 0.05)	840	581		781	671	
Time of topping						
50 days after sowing	13,306	11,294	12,300	9,186	7,173	8,100
60 days after sowing	13,718	11,933	12,826	9,599	7,813	8,706
No topping	14,576	12,276	13,426	10,576	8,276	9,426
CD (P = 0.05)	NS	821		957	822	
CV (%)	7.3	7.4		9.2	10.0	

Value of the produce (Rs/q) : Seed, 1,000; fibre, 400
Common expenditure, Rs 4,000/ha; additional cost due to topping, Rs 120/ha

However number of capsules/plant were higher with topping. Between the 2 stages, topping at 60 days appeared more promising for increasing the number of branches and capsules, which in turn enhanced the seed yield. The 1,000-seed weight did not vary due to topping.

Yield: The seed yield increased by 49 and 65 kg during 1990and by 18 and 57 kg during 1991 when topping was performed at 50 and 60 days respectively over no topping. On an average, the seed yield enhanced by 9.3% over the control. Topping at 60 days proved more advantageous than topping at 50 days, as it has resulted in 27 kg extra yield.

Contrary to the seed yield, topping had a negative effect on fibre yield. The fibre yield

reduced by 17.6 and 14.6% due to topping at 50 and 60 days respectively over no topping. This might be due to reduction in plant height owing to branching and withdrawal of food reserves from fibre filaments to nourish the developing pods and seeds. Moreover, there will be some fibre loss due to breakage of fibre at the point of branching and fibre from the pod-bearing portion cannot be extracted easily and ultimately results in lower fibre yield.

Economics

Early sowing recorded significantly higher returns and the increase was 15.9 and 25.6% in first and second years respectively. The cumulative increase in both seed and fibre yields in early-sown crop ultimately culminated in higher returns (Table 3).

No-topping treatment recorded higher returns than topping. Though there was increase in seed yield owing to topping, it could not reflect in total gross returns due to the fact that the loss in fibre yield on account of topping could not be compensated by the additional seed yield realized due to topping.

Net profit followed the similar trend as that of total gross monetary returns. However, when the advantage of topping in improving the seed yield alone was considered, by incurring an additional amount of Rs 120/ha, additional return of Rs 220/ha and Rs 490/ha can be accrued by resorting to topping at 50 and 60 days respectively.

Thus early sowing is advantageous to improve both seed and fibre yields. The topping proved its superiority when the crop is grown exclusively for seed production and fibre is treated as a bye-product.

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