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tudies on pod characteristics of annual moringa cv. PKM-1 as influenced y seasonal changes and growth regulators

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Abstract: An experiment was conducted at Horticultural College and Research Institute, TNAU, Coimbatore-3 during 1998-2000 to study the influence of sowing time and growth regulators on pod characteristics of annual moringa cv. PKM-1. Bimonthly sowing was taken from September'98 to July'99. Growth regulators as CCC 250 ppm, Ethrel 250 ppm, NAA 20 ppm, GA 20 ppm, 2,4-D 5 ppm, Salicylic acid 0.5% and Mepiquat chloride 50 ppm were sprayed on 90th day after sowing and pinching of growing terminal tips was done on 60th and 90th day after sowing. January sowing has greatly improved pod characters like pod length, specific gravity, number of seeds per pod, flesh content and pulp: seed ratio. Among the growth regulators applied, GA 20 ppm showed superior performance in all the characters studied.

Key Words: Sowing time, Growth regulators, Pinching, Pod characters.

ntroduction

Moringa is a multipurpose tree, wherein he leaves, flowers and fruits are used for ulinary and medicinal purposes. Invention of nnual moringa cv. PKM-1 is a milestone in he research on moringa by which the area nd productivity were greatly increased. It has ccupied considerable area in adjoining states lke Karnataka and Andhra Pradesh. Since it s a seed sown crop and annual in nature, t responds markedly to seasonal changes. The egetative phase is extended if it is sown in wrong season. Hence, investigations were taken n the influence of seasonal changes along vith the application of growth regulators over he pod characters of moringa.

Materials and methods

The experiment was taken up at Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during 1998-2000.

Sowings were taken at bimonthly intervals which commenced from September '98 to July 99 particularly during the first week of respective month. Growth regulators were sprayed on 90th day after sowing. In addition, physical regulation was also attempted by pinching treatment at wo stages i.e. 60th day and 90th day after sowing. Observations were recorded on pod length, specific gravity of pods, number of seeds per pod, flesh content of pods and pulp : seed ratio. Data were statistically analysed under split plot design using the method suggested by Panse and Sukhatme (1985).

Results and Discussion

Pod length is particularly important in moringa from the marketing point of view since longer pods are preferred by consumer. January sowing (78.0 cm) followed by November sowing (76.9 cm) topped in performance whereas September (69.0 cm) and July sowings (68.0 cm) exhibited poor performance . Higher chlorophyll contents, specific leaf weight and light interception might have contributed to the greater pod length and specific gravity observed in January sown trees. Moreover, the IAA oxidase content, which was low in the said seasons, should have facilitated better auxin level in the system which, in turn, could have improved the pod length. Number of seeds per pod is also important since it forms a part of food material. The higher number of seeds per pod, evident in January sown trees (19.1), could be associated with the greater length of pods. Likewise, the lowest content, registered in July sown trees (17.2), could only be due to the shorter length of pods. With regard to flesh content, which is directly proportional to pod length, the highest content was observed in

Table 1. Influence of sowing month and growth regulation on pod characters of annnual moringa c PKM 1

S.No.	Months of sowing	Pod length (cm)	Specific gravity of pods	No. of seeds per pod	Flesh content (g)	Pulp seed ratio	Moisture content (%
1.	September '98	69.0	1.45	17.6	68.1	0.16	85.57
2.	November '98	76.9	1.75	18.7	79.3	0.22	84.20
3.	January '99	78.0	1.84	19.1	81.1	0.23	83.24
4.	March '99	75.8	1.66	18.4	77.5	0.21	87.68
5.	May '99	71.8	1.53	17.9	74.4	0.18	88.47
6.	July '99	68.0	1.37	17.2	62.6	0.15	86.75
Growth regulators							
1.	CCC 250 ppm	74.3	1.58	18.3	77.1	0.18	84.9
2.	Ethrel 250 ppm	75.9	1.51	18.9	70.8	0.22	86.3
3.	NAA 20 ppm	78.9	1.88	19.7	80.8	0.27	87.7
4.	GA 20 ppm	91.4	2.08	21.7	87.9	0.33	88.3
5.	2,4-D 5 ppm	66.0	1.39	16.0	64.8	0.13	83.6
6.	Salicylic acid 0.5%	72.3	1.56	17.9	75.5	0.18	85.5
7.	Mepiquat chloride 50 ppm	72.6	1.60	18.1	77.1	0.19	86.1
Physical regulators							
1.	Pinching on 60th day	68.0	1.51	17.5	69.6	0.14	86.7
2.	Pinching on 90th day	68.0	1.46	17.2	68.6	0.14	86.0
	Control	65.1	1.43	16.4	66.0	0.13	84.3

	M	T	M	T	M	T	M	T	M	T	M	T
SEd	0.2	0.1	0.01	0.01	0.1	0.1	0.3	0.2	0.00	0.00	0.93	0.93
CD	0.4	0.3	0.02	0.03	0.3	0.3	0.8	0.4	0.01	0.02	2.40	1.87

January sown trees (81.1 g) and the least content in July sown trees (62.6). Similarly, pulp seed ratio which is a function of flesh content and number of seeds per pod revealed the same trend as these determining characters (0.23 by January sowing and 0.15 by July sowing).

Considering influence of growth regulating treatments on the above mentioned pod characters, higher values were recorded by GA 20 ppm (19.4 cm, 2.08 and 21.7) followed by NAA 20 ppm (78.9 cm, 1.88 and 19.7) and lower values by 2,4-D, 5 ppm treated trees (66.0 cm, 1.39 and 16.0) and control trees (65.1 cm, 1.43 and 16.4). Growth retardants *viz.* Mepiquat chloride 50 ppm, CCC 250 ppm and pinching treatments were intermediary in performane. GA is basically a growth promoter and hence, it might have subscribed to higher length of the pod, specific gravity and higher seed content.

It appears that presence of GA or auxin in the developing pod enhances the sink capacity to attract more assimilates and this view has amply been demonstrated by many workers (Chopra *et al.* 1965, Morton, 1991 and Verma *et al.* 1976). Though the interaction effect for pod length was significant, not much variation was noticed in the trend showing that either of the main or sub-plots had any influene on each other.

Flesh content was also higher with GA 20 ppm (87.9 gm) followed by NAA 20 ppm

).8 gm). Flesh content is a factor related pod length and weight and so, it might ve been higher with GA sprayed pods. Moreover, A promotes efficient pod filling by promoting tritional flow and as a consequence, the flesh ntent of pods also increased. The trend of ults of interaction effect had not shown any riation from the direct effect revealing the ong influence of main and sub-plot treatments flesh content. Similarly, spraying of GA ulted in higher ratio of pulp: seed (0.33) d NAA was found to be moderate in perforance 27). As obtained with pod characters, GA, ing a growth hormone, evinced a positive e by enhancing pulp and thereby higher io of pulp: seed. The interaction effect, though was found to be significant, had only limited riations under months of sowing and treatments. A 20 ppm followed by NAA 20 ppm remained nficantly different from each other and from rest of the treatments exhibiting the superiority the treatments under all the months of sowing. the other way interaction, all the months sowing almost remained on par under all sub-plot treatments making clear that the nths of sowing performed in the same manner espective of treatments.

For longer storability, the moisture content ould be maintained low as far as possible. the present study, contrary to trends observed many traits, moisture content was the highest th pods from trees sown during May (88.47%) d the lowest with pods from trees sown uring January (83.24%). This might be due the effect of climatic factors during the period of pod development. May sown crop was in full bearing during monsoon season and January crop was bearing heavily during summer, when the temperature (both maximum and minimum), sunshine hours, solar radiation and evaporation were high which might have resulted in poor moisture content of pods. Treatments imposed for growth regulation showed no profound effect on moisture content.

Conclusions

January sowing has greatly improved pod characters like pod length, specific gravity, number of seeds per pod, flesh content and pulp : seed ratio. Among the growth regulators applied, GA 20 ppm showed superior performance in all the characters studied.

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