BREEDING AND THE USE OF GIBBERELLIC ACID TO INCREASE SEED PRODUCTION IN PANSY (*VIOLA TRICOLOR* L.)

INTRODUCTION

Several varieties of Pansy, especially the Giant ones, set less seed under the prevailing weather conditions in the plains of India. It is for this reason it was thought desirable to try to increase seed production through selective breeding and also through the application of gibberellic acid to the pollinated flowers.

MATERIALS AND METHODS

The following varieties of Pansy were taken for the present investigation.

1. Single—The Royal Agri-Horticultural Society of India, Calcutta.
2. Giant—Indian Botanic Garden, Calcutta.

The seedlings were transplanted in six inches pots at the four-leaf stage.

Pollination was artificially done by hand between 8 a. m. and 11 a. m. and the necessary precautions were taken. Gibberellic acid was applied on pollinated flowers by spraying with an atomiser at different intervals of time. The concentrations used were 1, 10 and 100 ppm and the time of application was 0, 4, 8 and 24 hours after pollination.

OBSERVATIONS

It can be observed from Table I that pollen sterility of Giant Pansy was nearly double that of the Single one.

TABLE I

Plant growth, flowering and fruiting in two varieties of Pansy (*Viola tricolor* L.)

Observations		Pansy varieties	
		Single	Giant
Plant height (cm)	a	31.32±7.87	17.65±1.04
	b	18–65.5	14.8–26.0
Ist date of flower bud formation (days)	a	117.4±1.64	106.15±3.28
	b	102–132	96–121
Ist date of flowering (days)	a	122.22±5.60	112.25±4.25
	b	106–139	101–133
Flower size (cm) (length)	a	3.09±0.1	5.32±0.2
	b	2.6–3.5	4.1–6.0
Flower size (cm) (breadth)	a	2.61±0.06	4.86±0.38
	b	2.3–3.0	3.6–5.6
Pollen sterility (%)		6.24	10.15
Ist date of fruiting (days)	a	131.27±5.92	121.72±4.29
	b	122–148	109–143

a=Mean±S.E.
b = Range

It is evident from Table II that the percentage of fruits setting seeds was highest in 1 ppm application 24 hours after pollination (16.66 per cent over control) while in most of the other treatments it was below control.

Maturity of fruits was much delayed (5½ days later than control) from 100 ppm application 24 hours after pollination while in control and in most other treatments the fruits matured much earlier. Size of fruits increased by application of 100 ppm 8 and 24 hours after pollination while 1 ppm applied 0, 4, 8 and 24 hours and 10 ppm 0 and 4 hours after pollination showed a tendency towards decrease in the size of fruits in comparison with the control. Application of 10 ppm 8 and 24 hours after pollination, however, showed no appreciable difference.

Application of 10 ppm and 100 ppm 24 hours after pollination increased the number of seeds by 34 and 30 per cent respectively over control. Other treatments showed lower seed set than control and lowest seed set was from 1 ppm applied immediately after pollination.

Treatments with 10 ppm and 100 ppm 24 hours after pollination showed 186.6 and 200.8 per cent increase in seed weight respectively over control. One and 10 ppm applied 0 hours after pollination showed tendencies towards increase in seed weight. Percentage of good seed production was highest in those treated with 10 ppm 24 hours after pollination while in all the other treatments, except 10 ppm applied 8 hours after pollination, it was much below control.

DISCUSSION

It is evident from the above observations that crossing and application of GA was effective in increasing percentages of fruits setting seeds. While seed setting increased with 1 ppm GA applied 24 hours after pollination, application of 100 ppm GA showed increase in the size of fruits. This was especially true with 100 ppm GA applied 24 hours after pollination. It may be pointed out in this connection that although fruit size cannot be taken as the criterion for the yield of seeds, it is usually observed that smaller fruits usually bear less seeds which are also poor in quality.

Application of 10 and 100 ppm GA 24 hours after pollination has been found to be effective in increasing the number of seeds considerably. It was interest-

TABLE II

Fruit and seed set in Pansy (*Viola tricolor* L.) following treatment with different concentrations of GA of *Single* × *Giant* cross

Treatment		Maturity of fruits (days)			Fruit setting seeds (%)	Fruit size (mm)						No. of seeds per fruit			Weight of seeds per fruit (mg)			Wt. of seeds (mg)	Good seeds (%)		
						Length			*Breadth*												
Time of application (hrs)	Concentration of G. A. (ppm)	Range	Mean	±S.E.		Range	mean	±S. E.	Range	Mean	±S. E.	Range	Mean	±S. E.	Range	Mean	±S.E.		Range	Mean	±S.E.
0	1	23-29	24.0	±3.96	50	5.5-6.6	6.2	±0.11	2.5-3.5	3.0	±0.11	8-12	10.0	±0.4	6.1-7.0	6.6	±0.09	0.66	40-50	45	±1.1
,,	10	20-29	24.0	±1.07	50	6.6- 7.9	7.3	±0.22	3.5-4.5	4.0	±0.09	10-15	12.0	±0.14	8.5- 9.3	8.9	±0.08	0.741	50-60	55	±1.13
,,	100	21-29	25.0	±0.84	55	7.4- 8.6	8.0	±0.13	4.0-5.4	4.5	±0.16	15-16	15.8	±0.13	11.9-12.5	12.2	±0.06	0.77	46-55	50	±1.10
4	1	20-28	24.5	±0.74	55	6.0- 7.2	6.5	±0.14	3.1-3.9	3.5	±0.08	12-16	14.0	±0.46	10.2-11.0	10.6	±0.09	0.75	45-54	50	±1.05
,,	10	20-29	24.0	±1.00	50	6.0- 7.0	6.5	±0.08	3.9-4.6	4.3	±0.06	16-20	18.0	±0.36	13.0-14.0	13.5	±0.12	0.75	60-69	65	±1.00
,,	100	20-31	26.0	±1.01	50	8.0-9.0	8.5	±0.11	4.0-5.0	4.5	±0.10	13-19	16.6	±0.66	12.6-13.3	13.0	±0.07	0.78	52-60	56	±0.81
8	1	21-31	25.5	±0.98	55	6.3- 7.4	6.7	±0.56	3.4-4.1	3.8	±0.07	11-14	12.5	±0.27	11.4-12.0	11.7	±0.07	0.93	50-58	54	±0.81
,,	10	23-31	26.0	±0.85	55	7.8- 8.7	8.3	±0.11	4.0-4.9	4.4	±0.09	16-20	17.3	±0.45	13.8-14.5	14.2	±0.08	0.82	78-85	82	±0.72
,,	100	22-31	26.0	±0.97	50	8.5-9.5	9.0	±0.10	4.0-5.0	4.5	±0.11	15-20	17.4	±0.44	13.3-14.0	13.66	±0.07	0.78	55-65	60	±1.01
24	1	20-29	25.0	±1.05	70	6.6-7.5	7.1	±0.11	3.6-4.4	4.0	±0.08	16-21	18.2	±0.19	20.3-21.1	20.7	±0.08	1.13	60-70	64	±1.2
,,	10	22-33	27.5	±1.15	60	7.5- 8.5	8.0	±0.10	3.8-4.5	4.2	±0.08	24-30	26.8	±0.74	29.8-30.5	30.1	±0.45	1.12	92-100	96	±0.93
,,	100	25-35	29.5	±1.15	55	9.7-10.5	10.0	±0.31	4.4-5.6	5.0	±0.14	22-30	26.1	±0.82	31.2-32.0	31.59	±0.08	1.21	66-76	71	±1.6
CONTROL		20-29	24.0	±0.76	60	7.3- 8.5	8.0	±0.64	3.5-4.5	4.0	±0.11	16-25	20	±1.24	9-13	10.5	±0.58	0.525	76-85	80.4	±1.01

ing to note that GA treatment 24 hours after pollination showed remarkable increase in the weight of the individual seeds. For instance, 100 ppm applied 24 hours after pollination showed 130.4 per cent increase in individual seed weight over control. Good seeds were, however, obtained with 10 ppm applied 24 hours after pollination. Harrington (1960) also observed increase in yield of lettuce seeds by using 3-10 ppm of GA and Nitsch (1961) has discussed the role of GA in inducing fruit set in different kinds of plants. Earlier, Chandler (1957) stressed the role of GA in fruit set and seed production and Wittwer and Bukovac (1958) mentioned the effectiveness of GA in inducing fruit set and fruit development. Recently, Chakrabarty (1965) got encouraging results in Pansy as regards fruit set and seed production after application of GA and other growth substances.

This preliminary investigation suggests interesting possibilities of improving seed production in Pansy through selective crossing and by the application of GA.

SUMMARY

This investigation was undertaken to try to increase seed production in Pansy by breeding and by the application of GA which was used in three concentrations (1, 10 and 100 ppm) each applied 0, 4, 8 and 24 hours after pollination.

Ten ppm GA applied immediately after pollination resulted in early maturity of fruits whereas all the other treatments gave late maturity. Percentage of seed set increased by 1 ppm GA applied 24 hours after pollination. Increase in fruit size was found when 100 ppm GA was applied 24 hours after pollination. Application of 10 and 100 ppm GA 24 hours after pollination showed 186.6 per cent and 200.8 per cent increase in seed weight respectively over control. All the other treatments showed increase in individual seed weight. 10 ppm GA sprayed 24 hours after pollination produced large number of good seeds.

ACKNOWLEDGEMENTS

Sincere thanks are due to Prof. P. K. Sen, Khaira Professor and Head of the Department, for his interest and for providing facilities during the course of this investigation. Sincere thanks are also due to late Dr. J. Sen, former Deputy Director, Indian Botanic Garden and to Dr. T. K. Bose, Secretary, The Royal Agri-Horticultural Society of India, for kindly supplying plant materials.

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NEW AND LITTLE KNOWN TAXA FROM ANAIMUDI AND SURROUNDING REGIONS, DEVICOLAM, KERALA-II: A NEW SPECIES OF *HEDYOTIS* LINN.

Hedyotis santapaui Shetty et Vivek., spec. nov.

Affinis *Hedyotidi articulari* R. Br. ex G. Don, a qua tamen differt foliis maioribus; stipulis elliptico-ovatis vel elliptico lanceo-latis, ad apicem angustatis, pectinatis, dentibus longis et brevibus, glandularibus, appendice duplici cristae simili basali ornatis; calycis dentibus longioribus, lineari-lanceolatis; fructibus apice elevato et protruso inter calycis dentes.

Subfrutices, *ca.* 1.5 m alti; rami quadrangulares glabri, cicatricibus petiolorum et stipularum eminentibus; spatia internodalia 3-8.5 mm longa. Folia 2.1-7 × 0.5-1.95 cm, simplicia, opposita, ad apices ramorum conferta, lanceolata, ad basin rotundata, ad apicem acuta, marginibus paulum recurvis, lutea cum sicca; rhaphides in pagina inferiore adsunt, sparsae, adscendentes; nervi laterales 4-9-jugi, versus apicem arcuati. Stipulae 0.8-1.75 cm longae, ad basin connatae, elliptico-ovatae vel elliptico-lanceolatae, carinatae, ad apicem angustatae, pectinatae dentibus longis et brevibus glandularibus, stipulae basi appendice duplici ornata extus; appendices cristae similes, decurrentes ut alae angustae in internodos; rhaphides adsunt in stipulis et appendicibus, sparsae, adscendentes. Cymae in paniculas terminales dispositae, confertae; pedunculis quadrangularibus, puberulis. Bracteae 0.8-3.6 × 0·5-1·1 cm.