

Study on the comparative effect of natural and synthetic growth Regulators

FOR BETTER AND QUICKER GERMINATION OF SEEDS

Introduction

Considerable work has been done by various workers in many countries on the prospect of increasing crop yield by the treatment of seeds with hormones before sowing. The most important aims of such treatments are to improve the percentage of germination, to accelerate the speed of germination, to increase the general vigour of seedlings and to increase the yield of crop.

In the present investigation the first two aspects viz. better and quicker germination of seeds are studied with natural and synthetic growth regulators.

Review of previous work

Audus (1953) has recorded that a stimulation of the germination of seeds of oats, wheat, tomato and radish and also a partial suppression of germination of seeds of sugar beet and cabbage when pre-treated with hormones. Some success has been claimed for a variety of species (Amlong & Naundorf, 1937) by soaking seeds for 24 hours in solution of 0.02 to 0.2% IAA.

The researches of Thimman and Lane (1938) have shown that the growth and yield of plants can be improved by supplying suitable concentrations of certain growth

regulators to soaked seeds or seedlings, when the plants from the pre-treated seedlings are found to grow better with increased final weights over control.

Biswas and Ghosh (1938) have shown that Vitamin C content in coconut water is richest in the green nut with soft pulp, gradually diminishing with ripening and Banerjee (1935) found Vitamin C content of green coconut kernel to be 0.2 mg. to 0.4 mg/g as well as a thermolabile protective agent for Vitamin C content present in the water.

In the Wealth of India, Raw Materials 11 (1950) it has been recorded that tender coconut water contains moisture 95.50, ash (minerals) 0.40, other extractives 0.10 proteins 0.10 and carbohydrates 15.90.

Audus (1953) has recorded that urine contains certain auxins (auxentriolic acid (A) and auxenolonic acid (B)) which induce root formation in plants.

In a recent report by Srinivasan and Gopalakrishnan (1956) it is stated that for quickness in germination, rate of germination and better germination seeds kept in cow dung cake are the best followed by the seeds soaked in cow dung emulsion.

Haber (1957) has recorded that soaking in water, particularly in hot water, for hastening germination, has been practiced for many years.

Materials and Methods

In order to find the comparative effect of various solutions having hormonal influence on the germination of hard and soft coated seeds, an experiment was conducted in the Agricultural Botany Division, Agricultural College and Research Institute, Vellayani, Kerala in July 1962 with the following seeds and pre-treatments.

Seeds of bittergourd, representing hard coated seeds, and beans and green gram, representing soft coated seeds, collected from the previous year's crops, were selected for the trial. Fifty seeds from each species were taken and soaked in the following solutions for 24 hours before sowing.

1. Seeds Soaked in cow dung emulsion for 24 hours
2. Do. in cow's urine (undiluted) Do.
3. Do. in tender coconut water Do.
4. Do. in mature coconut water Do.
5. Do. in 0.02% IAA solutions Do.
6. Do. in 0.02% NAA solutions Do.
7. Do. in 0.02% IBA solutions Do.
8. Do. in water (control) Do.

The seeds were treated on 11-7-1962 and after 24 hours soaking, they were taken out thoroughly washed in running water and immediately dibbled in separate pots containing

river sand at a uniform depth on 12-7-1962. The pots were arranged in an open place and watered daily, in the morning and evening. The date of commencement of germination, the number of seeds germinated and the date of completion of germination under each treatment were recorded daily for a fortnight. The results of the trial are presented in Tables I, II and III.

Results and Discussion

1. *Bittergourd.* It was observed that bittergourd seeds start germinating after five days of sowing in all treatments except those treated with hormone solutions. The highest percentage of germination was obtained for the seeds soaked in mature coconut water (84%) followed by the seeds soaked in tender coconut water (82%). Seeds soaked in cowdung emulsion and cow's urine gave a higher percentage of germination (80%) than the control (76%). All the three hormone treated seeds gave negative result.

2. *Bean seed.* The seeds soaked in tender and mature coconut water start germinating after two days of sowing and the highest percentage of seeds germinated on the first day in these treatments was 44 and 50 respectively. It was observed that cow's urine and the three hormones completely inhibited germination. The highest percentage of germination was observed in regard to the seeds treated with mature coconut water (76%) followed by tender coconut water (74%). The seeds soaked in cowdung emulsion and control gave only 44% each.

3. *Green gram.* It was seen that green gram seeds start germinating after three

days in all treatments except for those soaked in cow's urine and the three hormones completely suppressed germination as in the previous case. The highest percentage of germination on the first day of sprouting was noticed in cow dung emulsion treated seeds. However the highest overall percentage of germination was observed for the seeds soaked in tender coconut water (82%) followed by mature coconut water and cow dung emulsion (80%). The control gave only 76% germination.

TABLE t
Details of germination of Bittergourd seeds

Date	Cowdung emulsion	Cow's urine.	Tender Co-conut water	Mature Co-nut water.	IAA 0.02%	NAA 0.02%	IBA 0.02%	Water
13-7-62	nil	nil	nil	nil	nil	nil	nil	nil
14-7-62	nil	nil	nil	nil	nil	nil	nil	nil
15-7-62	nil	nil	nil	nil	nil	nil	nil	nil
16-7-62	nil	nil	nil	nil	nil	nil	nil	nil
17-7-62	nil	nil	nil	nil	nil	nil	nil	nil
18-7-62	17	5	12	18	nil	nil	nil	12
19-7-62	15	13	16	15	nil	nil	nil	10
20-7-62	5	13	5	6	1	nil	nil	11
21-7-62	1	5	5	2	nil	nil	nil	5
22-7-62	1	2	1	1	nil	2	nil	nil
23-7-62	1	2	1	nil	nil	nil	nil	nil
24-7-62	nil	nil	nil	nil	nil	nil	oil	nil
25-7-62	nil	nil	nil	nil	nil	nil	nil	nil
26-7-62	nil	nil	nil	nil	nil	nil	nil	nil
Total	40	40	41	42	1	2	nil	38
Germination %	80	80	82	84	2	4	nil	76

TABLE II

Details of germination of Bean seeds.

Date	Cowdung emulsion	Cow's urine	Tender Coconut water	Mature Coconut water.	IAA 0.02%	NAA 0.02%	IBA 0.02%	Water
13-7-62	nil	nil	nil	nil	nil	nil	nil	nil
14-7-62	nil	nil	nil	nil	nil	nil	nil	nil
15-7-62	11	1	22	25	1	1	nil	15
16-7-62	2	nil	7	4	nil	1	nil	2
17-7-62	4	1	5	4	nil	nil	nil	4
18-7-62	1	1	2	2	nil	nil	nil	nil
19-7-62	2	1	nil	2	nil	nil	nil	1
20-7-62	1	nil	nil	1	nil	nil	nil	nil
21-7-62	1	nil	nil	nil	nil	nil	nil	nil
22-7-62	nil	nil	nil	nil	nil	nil	nil	nil
23-7-62	nil	nil	1	nil	nil	nil	nil	nil
24-7-62	nil	nil	nil	nil	nil	nil	nil	nil
25-7-62	nil	nil	nil	nil	nil	nil	nil	nil
26-7-62	nil	nil	nil	nil	nil	nil	nil	nil
Total	22	4	37	38	1	2	nil	22
Germination %	44	8	74	76	2	4	nil	44

TABLE III

Details of germination of Green gram

Date	Cowdung emulsion	Cow's urine	Tender Coconut water	Mature Coconut water.	IAA 0.02%	NAA 0.02%	IBA 0.02%	Water
13-7-62	nil	nil	nil	nil	nil	nil	nil	nil
14-7-62	nil	nil	nil	nil	nil	nil	nil	nil
15-7-62	nil	nil	nil	nil	nil	nil	nil	nil
16-7-62	24	nil	20	16	nil	nil	1	18
17-7-62	13	nil	9	5	1	nil	nil	9
18-7-62	1	nil	4	5	nil	nil	nil	6
19-7-62	nil	nil	5	6	nil	nil	nil	3
20-7-62	1	nil	3	3	nil	nil	nil	2
21-7-62	1	nil	nil	3	nil	nil	nil	nil
22-7-62	nil	nil	nil	2	nil	nil	nil	nil
23-7-62	nil	nil	nil	nil	nil	nil	nil	nil
24-7-62	nil	nil	nil	nil	nil	nil	nil	nil
25-7-62	nil	nil	nil	nil	nil	nil	nil	nil
26-7-62	nil	nil	nil	nil	nil	nil	nil	nil
Total	40	nil	41	40	1	nil	1	38
Germination %	80	nil	82	80	2	nil	2	76

Summary and conclusion

1. Mature coconut water and tender coconut water give the highest percentage of germination of bitter gourd seed (hard coated seed) followed by cowdung emulsion and cow's urine.
2. Soft coated seeds (beans and green gram) germinate best in mature and tender coconut water.
3. Synthetic hormones of 0.02% IAA, NAA and IBA are found to inhibit germination of both hard and soft coated seeds,

4. Cow's urine (**undiluted**) **inhibits** germination of soft coated seeds, whereas it has no ill effect on the germination of hard coated seeds.

5. Coconut water, both from tender and mature nuts, accelerate germination of both hard and soft coated seeds.

ACKNOWLEDGMENT

The **author** wishes to express his sincere thanks to Professor L. S. S. **Kumar**, Dean and Additional **Director** (Research), **Agricultural College and Research Institute, Vellayani, Kerala** for the **valuable** guidance given during the course of **the** investigation. My thanks are also due to Sri. K. Vasukuttan Nair, Laboratory Assistant for **help** rendered to me in conducting the trial.

P. KUMARA **PILLAI**.

Agricultural College and **Research** }
 Institute, Vellayani, Kerala, }
 August 6, 1962. }

References

- | | |
|---|---|
| Audus , L. J. | Plant Growth Substances, 1953, 84. |
| Banarjee , H. N. | <i>Trans. Bose. Res. Inst.</i> , 1935, 10, 145. |
| Biswas, H. H. and Ghosh, A. G. | <i>Science and Culture.</i> , 1938, I, 518. |
| John P. Mahlstede Ernest S. Haber . | <i>Plant Propagation</i> , 1957, 107. |
| Srinivasan, V and Gopalakrishnan , P. | <i>Madras Agri. J.</i> Vol. XLIII, Feb. 1956. |
| Thimman , K. V. and Lane, R. H. | <i>Amer. J. Bot.</i> , 1938, 535. |
| Wealth of India, Raw Materials 11.1950 , | Govt. of India Press, N. D. |