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Effect of GA_3 and KNO_3 on seedling establishment of *Luffa acutangula* (L.) Roxb.

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ABSTRACT

Luffa acutangula (L.) Roxb. var. amara. Clark (Family: Cucurbitaceae) is a commonly useful vegetable which is rich in nutrients. The main investigation of this study is to find out the absolute chemicals which break their dormancy. It was found that 2% KNO_3 is most effective than all other concentration of chemical, GA_3 is also a germination enhancing hormone.

Key words: *Luffa acutangula (L.) Roxb. var. amara. KNO_3 and GA_3*

INTRODUCTION

Dormancy is a condition in which seeds do not germinate even when the environmental conditions (water, temperature and aeration) are permissive for germination[16,2,9]. *Luffa acutangula* (L.) Roxb. var. *amara.* Clark (Family: Cucurbitaceae), commonly known as ridge gourd, angled Luffa or ribbed gourd, is one of the most popular vegetable. This climber vegetable is belong to the family Cucurbitaceae, which is an annual plant and monoecious in nature. It is locally known as *Jika* in Assam.

Young green fruits of this plant are generally used as vegetable. This fruit is nutritionally rich in vitamin A, C and Fe[20] and its various plant parts commonly used in traditional medicine. It has anti tumour, antioxidant and immune modulator properties[15].

There are several varieties of Luffa in Assam, but the presently studied is a locally grown variety and is commonly known as Satsatti or Satfatti Jika. Flowers are yellow in colour and flowering occurs at the time of evening which is also eaten as vegetable by the tribes of Assam. *amara* variety of Luffa is a local variety of Luffa grows commonly in Assam. Which is small in size about 8-10 cm in log and 7-9 cm in diameter. Develops 4-6 fruits in a branch. It has own natural scent and is so much delicious test. in This variety is commonly cultivated in Assam last few years. But due to development of several hybrid varieties of Luffa, this local variety is going to be extent day to day. One of the major causes of its population extinct is due to poor germination of seed. The hard seed coat is impermeable to water.

Luffa acutangula (L.) Roxb. var. *amara* is typically propagated through seeds. But traditional method is so time consuming and also shows very poor germination. So, an experiment was conducted in Goalpara College by Dept. of botany by different concentrations of GA_3 and KNO_3. The main aim of the study is to find out the appropriate concentrations of chemicals for *Luffa* seed germination.

Gibberellin is one of the naturally occurring plant hormone and play an important role in and physiological activities of a plant in dormancy, germination and promote the vegetative growth.

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Dormant seeds which require stratification, dry storage after ripening and light as a germination stimulator, are often treated with GA_3 to overcome their dormancy. Gibberellic acid (GA_3, GA_4, and GA_7) has been shown to break dormancy and increase germination in seeds of several genera[3,4]. Gibbrellic acid is now a day's considered as one of the potential germination promoters of different species viz. Brinjal[8]. Gibberellins showed to increase germination in several species[5,7,10] and to overcome physiological dormancy in seeds with dormant embryos[9]. Seed dormancy may be caused by an inadequate development of embryo and/or an existence of chemical inhibitors[10].

The use of potassium nitrate (KNO_3) has been an important seed treatment in seed-testing laboratories for many years without a good explanation for its action mechanism. Seed priming with KNO_3 showed enhancement in seed germination, seedling emergence, vigour index in different vegetables crops[11,17,14,19,6].

MATERIALS AND METHOD

This experiment was conducted in the natural conditions of Goalpara college campus during the month of July to August of 2014. For treatment, two chemicals were used to stimulate germination. Each seed group of *Luffa* was soaked in solutions of Gibberellic acid (GA_3) and potassium nitrate (KNO_3) at different concentrations for 24 hour and are placed in two different media i.e. Soil media and sand media. For GA_3 the concentrations are 100 ppm (T1), 200 ppm (T2), 300ppm (T3), 400 ppm (T4) and for KNO_3 the concentrations are 0.1% (T5), 0.2% (T6), 0.3% (T7), 0.4% (T8) and 0.5% (T9). Same numbers of seeds are also treated with heat for 3 minute (T10). 10 numbers of seeds are also soaked in distilled water for 72 hours (T11) and same ones are also considered as control (T12). In germination experiments, seeds of all treatments placed on filter paper moistened with 3% fungicide solution (Captan). All the treated seeds are placed in sand media which are filled up in Polly bags. All the experimental materials are placed in an area where direct sunlight is not effect. Watering was done at an interval of two days for 7 days. All seeds with at least a 5 mm long radical were considered as germinated. From germination measurement was taken at an interval of three days. At time of measurement geminating seeds and length of roots.

Preparation of test solutions

Gibberellin (GA_3)

The required quantity of gibberellins (GA_3) was dissolved in little absolute ethyl alcohol solution and then diluted with distilled water to give a stock solution of 1000 ppm. From the stock solution, further dilutions were made according to the treatment requirement by using distilled water.

Potassium nitrate (KNO_3)

It was prepared by dissolving 20 g of KNO_3 in distilled water and volume was made up to 1000 ml. From the stock solution, further dilutions were made according to the requirement by using distilled water.

Hot water treatment

Six (6) numbers of seeds were tied in a muslin cloth bag and exposed at 50°C for 5 minute and tested for germination.

Water treatment

For water treatment 6 numbers of seeds are soaked in distilled water for 72 hours and tested for germination.

Preparation of media

The treatment seeds are placed in soil media, which is prepared along with cow dung and sand i.e. 50% soil +25% cow dung + 25% sand. The soil media are filled up in black coloured poly bags. The seeds are deep just below 1cm in propagated media. The experimental propagated materials are placed in a sunny place in botanical garden of Goalpara college. Watering was be done one time per day at the interval of two days.

The seeds were considered germinated when its radical was about 1mm long. After germination the number of germinating seeds and length of were recorded at an interval of 2 days for all the 12 treatments.

RESULT AND DISCUSSION

It was observed that germination of the seeds started after 5 days of sowing. It was seen that 50% seeds were germinated in T2 (200 ppm GA) till 1st measurement, followed by T3, T6, T1and T7. Where as in

T4, T5, T8, T9, T10, T11, T12 the seeds are not germinated till 6th day. After recording the number and length, the seedlings are again plotted in media. It was also found that mean length of T2 is also highest (0.28) than that of other treatments. It is interestingly observed that at 4th reading T2 Shows 100% seed germination. The mean germination percentage is obviously higher in T2 (83.3) than other treatment. The and 200 ppm concentration of GA_3. The result revealed that seeds treated with GA_3 at 200 ppm recorded higher germination (100%) in 5th reading i.e. after 30 days. It is very interesting that there was no germination in control, 300ppm, 400 ppm and water soaked lots of seeds during the first reading. Even during second reading the seeds of the control as well as of the water soaked batch there was no germination.

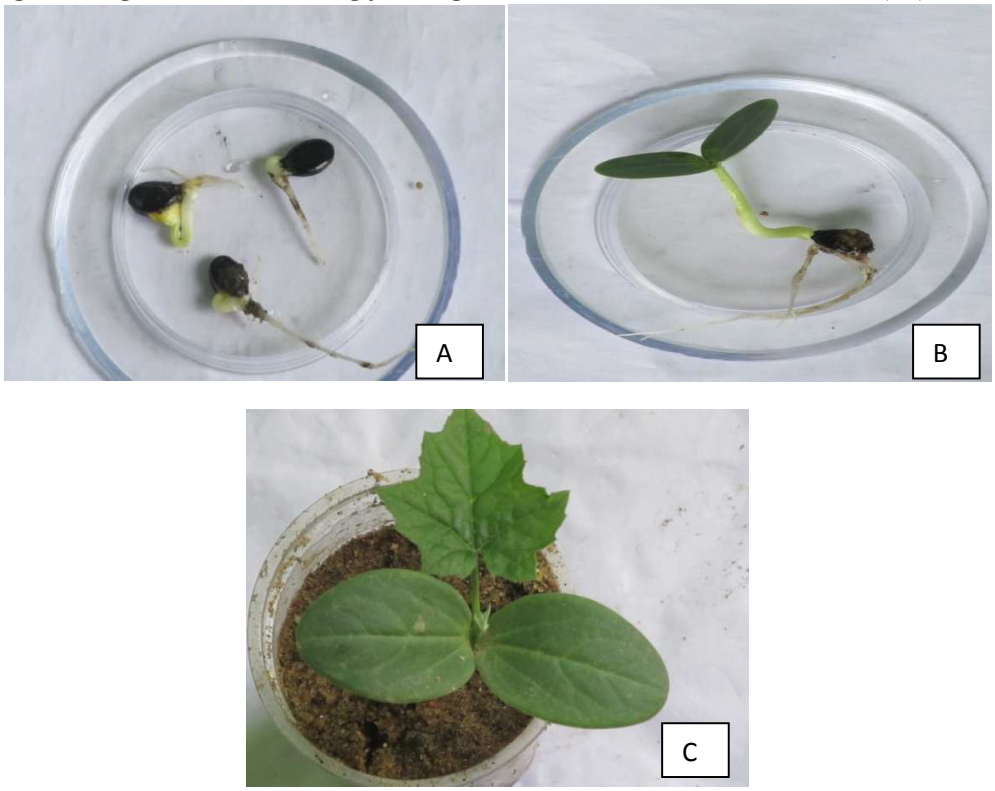
Table 2: Table showing the Germination and un geminating percentage

Treatment	Germination percentage (%)							Un germinated seed (%)						
	D1	D2	D3	D4	D5	D6	Mean	D1	D2	D3	D4	D5	D6	Mean
T1	16.6	33.3	50	66.6	66.6	66.6	**49.95**	83.3	66.6	50	33.3	33.3	33.3	**49.96**
T2	50	66.6	83.3	100	100	100	**83.3**	50	33.3	16.6	0	0	0	**16.65**
T3	33.3	50	50	66.6	83.3	83.3	**61.0**	66.6	50	50	33.3	16.6	16.6	**38.85**
T4	0	0	16.6	16.6	33.3	50	**19.41**	100	100	83.3	83.3	66.6	50	**80.5**
T5	0	16.6	33.3	33.3	50	66.6	**33.3**	100	83.3	66.6	66.6	50	33.3	**66.63**
T6	33.3	66.6	50	66.6	83.3	100	**66.63**	66.6	33.3	50	33.3	16.6	0	**33.3**
T7	16.6	33.3	50	66.6	66.6	83.3	**52.73**	83.3	66.6	50	33.3	33.3	16.6	**47.1**
T8	0	16.6	33.3	50	50	50	**33.31**	100	83.3	66.6	50	50	50	**66.65**
T9	0	0	33.3	33.3	50	50	**27.76**	100	100	66.6	66.6	50	50	**72.28**
T10	0	0	16.6	16.6	16.6	16.6	**11.0**	100	100	83.3	83.3	83.3	83.3	**88.86**
T11	0	0	33.3	50	50	50	**30.55**	100	100	66.6	50	50	50	**69.43**
T12	0	0	0	16.6	33.3	33.3	**13.86**	100	100	100	83.3	66.6	66.6	**86.08**

Fig 2: Mean length of seedling in sand media

Duration	Treatment											
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
D1	0.13	0.38	0.21	0	0	.18	0.1	0	0	0	0	0
D2	0.3	0.70	0.41	0	0.1	0.36	0.26	.11	0	0	0	0
D3	0.46	1.11	0.55	0.08	0.25	0.56	0.5	0.3	0.21	.11	.21	0
D4	0.66	1.53	0.78	0.11	0.45	0.96	0.78	.48	0.35	0.15	0.4	0.11
D5	.88	1.78	1.03	0.26	0.66	1.33	0.96	.63	0.48	0.2	0.55	0.31
D6	0.96	2.08	1.26	0.48	0.91	1.55	1.3	.75	0.65	0.25	0.71	0.41

Fig.1: Seed germinated accordingly during 1st, 3rd and final measurement at 2% (T6) KNO_3



CONCLUSION

At the end of the experiment it can be said that treating *Luffa acutangula* seeds with GA_3 is significantly effective and KNO_3 is also having positive effect for seed germination for this species. From the experiment it was found that in normal condition as well as by treating seeds with distilled water and hot water treatment has no such positive effect on germination. From the experiment it is observed that at T2 (200 ppm GA) shows higher percentage of germination along with seedling. In case of KNO_3 0.2% shows better result than other concentration. The mean percentage of geed viability in T6 is 63.3 and at 6th measurement it shows 100% of germination.

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