Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(5): 628-630
Received: 19-06-2020
Accepted: 21-08-2020

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Effect of kinetin on growth parameters of cowpea (*Vigna unguiculata* L.)

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Abstract
Objective: In the present investigation we study the response of two different varieties *i.e.* Kashi Unnati and Kashi Kanchan of Cowpea (*Vigna unguiculata)* seeds to three different concentrations of Kinetin.
Method: We have prepared three different concentrations of Kinetin i.e. 10, 20 and 30ppm.
Result: By the results of present study we conclude that seeds of both varieties soaked in Kinetin were enhanced in all the early seedling growth and yield parameters studied in comparison to those seeds which are presoaked in distilled water i.e. control.

Keywords: Kinetin, early seedling growth, cowpea

Introduction
Plant hormone may be defined as an organic substance other than a nutrient, active in very minute amounts which are formed in certain parts of the plant and which are usually translocated to other sites, where it evokes specific biochemical, physiological and/or morphological responses. The precise location of synthesis of phytohormones is uncertain out actively growing leaves, fruits and developing seeds are thought to be the active sites of synthesis of phytohormones. However, it appears that all tissues have the potential to produce any of the phytohormones, which are transported via the xylem or phloem and by diffusion such as in the case of ethylene. But phytohormones a major component of oil and protein structure found to enhance both the yield and quality of crops (Khan *et al*., 2004) [4].
Cowpea (*Vigna unguiculata* (L.) walp) being termed as black-eyepea, kaffir pea, china pea, southern bean, is considered as a miracle crop of the world. Cowpea belongs to the family *leguminosae*, sub family *Fabaceae* and genus *Vigna*. (Lone *et al*., 2005) [6]. The worldwide important cowpea growing countries are India, Indonesia, Korea, Myanmar, Nepal, Philippines, Srilanka, Thailand, Brazil, Cuba, Haiti, USA and the West Indies. In India, cowpea is extensively grown in Southern India particularly in the states of Andhra Pradesh, Karnataka and Tamil Nadu. Pulses constitute the main source of protein and essential amino acids for the predominantly vegetarian population and lower income groups of the country. Being leguminous in nature it fixes nitrogen from the atmosphere to enrich soil fertility (Mir *et al*., 2009) [7]. The growth regulators or promoters like Kinetin and NAA stimulate vegetative growth and are involved in the initiation of cell division in the cambium. These plant growth regulators cause osmotic uptake of water which maintain a swelling force against the softening of cell wall. (Khan *et al*., 2007) [5]. Kinetin has been implicated in a wide range of developmental processes, some of them include elongation growth, photo-and gravitropism, apical dominance, lateral root initiation, the differentiation of vascular tissues, embryogenesis, fruit setting and ripening and senescence**.** Grain legumes occupy an important position in the world agriculture by virtue of their high vegetable protein content, wide acceptance as part of the human diet, low cost of production, capacity for fixing atmospheric nitrogen and their easy and safe transportability. The problems of protein malnutrition in the developing countries of the world can be solved by increasing the production of grain legumes. It has been reported that in some areas of the semi-humid tropics, Cowpea provides more than half the protein in human diet. The objective of this study was to investigate the effect of different concentrations of Kinetin on growth parameters of Cowpea seeds

Material and Methods
A pot experiment was conducted in Department of Seed Technology, R.B.S. College, Agra. Two varieties of *Cowpea i.e.* Kashi Unnati and Kashi Kanchan were obtained from I.A.R.I. New Delhi, they were surface sterilized in 1% sodium hypochlorite solution for 3 minutes, then rinsed with sterilized water and air dried before the start of experiment. Three different combinations of Kinetin were prepared for the experiment i.e.10 ppm, 20ppm and 30ppm.

Along with the treatments all the varieties had their separate controls. Seeds were considered as germinated when there is an emergence of radical from the seed coat. The final germination percentage was taken after 240 hrs and seedling fresh weight was taken immediately at that time, seedling dry weight were evaluated after 48 hrs in an oven at 800C. For measurement of radical & plumule length the seeds of each replicate were retained at the end of the experiment, No. of Pods per Plant, No. of Seeds per Plant, 1000 seed weight and Seed yield per plant were observed at the time of maturation

Result and Discussion

Kinetin was tested in three treatments such as 10ppm 20ppm and 30ppm on two varieties of Cowpea i.e. Kashi Unnati and Kashi Kanchan. Among the two cultivars Kashi Kanchan was the best in comparison to Kashi Unnati in terms of all the early seedling growth parameters were concerned. In the case of germination percentage it is quite evident from the data that cultivar Kashi Kanchan had showed good response towards Kinetin as it was 100% under treatment of 30 ppm in comparison to 85% of control. Among the two varieties cultivar Kashi Unnati was worst performer as its germination percentage were 94% under treatment of 30ppm in comparison to 80% of control. Whether there is a case of plumule length or radical length cultivar Kashi Kanchan was the best performer. The plumule length was 9.52 mm under treatment of 30ppm in comparison to 6.75 mm of control while the radical length was

7.90 mm under treatment of 30ppm in comparison to 5.28 mm of control. Application of Kinetin had influenced the early seedling growth in all the four cultivars under investigation which is quite evident from the fact that all the cultivar investigated showed good performance. The best performance was showed by cultivar Kashi Kanchan as its seedling fresh weight was 1.40 gm under the treatment of 30 ppm in comparison to 1.02 gm of control. In the case of seedling dry weight also cultivar Kashi Kanchan was best as it was 0.080 gm under the treatment of 30 ppm in comparison to 0.040 gm of control. The results of the present investigation suggest that application of Kinetin was beneficial in both the varieties by enhancing the germination percentage, its seedling length (plumule and radical length) as well as its fresh and dry content**.** As far as the different yield parameters were concerned it was found that all the yield parameters studied such as No. of Pods per plant Kashi Kanchan have 12.67 (30 ppm) in comparison to 7.7 (control), No. of Seeds per Plant Kashi Kanchan have 12.675 (30 ppm) in comparison to 10.65 (control), 1000 Seeds weight Kashi Kanchan have 103.366 (30 ppm) in comparison to 98.75 (control) and Seed yield per plant Kashi Kanchan have 14.75gm (30ppm) in comparison to 6.18 (control). Both the varieties were positively affected by the use of different concentration of kinetin. Numerous studies have demonstrated improvement in seed germination of different plant species in response to priming with plant growth hormones (Ashraf and Foolad, 2005) [1]. Kinetin have been reported to increase germination percentage and seedling growth as they have been found to play a control role in the integration of the responses expressed by plants. This could be explained by more rapid water uptake in primed seeds because germination in primed seeds started after 24 hr. It supports that priming caused more rapid water uptake than control. These results agree with Murillo - Amador *et al*. (2002) [8] in cowpea and Singh (2011) [9] in mustard. The Pre-sowing treatments cause initiation of the early metabolic processes and the re-drying of seeds arrest, but do not reverse, the initial stages of germination so that on the availability of suitable conditions, the time taken to germinate is reduced (Bewley and Black, 1982) [2]. Priming induced activation of metabolic events (Singh, 2012) [10] has been reported in seeds of various plant species. It was observed that priming improved root and shoot growth as compared to control. Higher fresh weight of plants, shoots and roots were also recorded from primed seeds as compared to control. Major effect of seed treatment on seedling growth observed was due to faster emergence, giving seedlings a longer time to develop (Jamil and Rha, 2004) [3].

Conclusion

Exogenous application of plant growth hormone is shown to effectively improve germination as well as growth of various crop species. In this study the positive effect of Kinetin hormone on growth parameters such as germination percentage, plumule and radical length as well as seedling fresh and dry weight have been showed. It showed that high concentration of Kinetin was promotive in all the parameters studied of both varieties studied and among the two varieties Kashi Kanchan was the better performer in comparison to Kashi Unnati variety.

Table 1: Effect of Kinetin on early seedling growth of Cowpea cultivars (Kashi Kanchan and Kashi Unnati)

Variety	Treatment	Germination%	Plumule length (mm)	Radicle length (mm)	Seedling fresh weight(g)	Seedling dry weight(g)
KK	0 PPM	80.55	6.205	5.162	1.007	0.0407
KK	10 PPM	83.27	6.572	5.410	1.075	0.0485
KK	20 PPM	90.75	8.442	7.395	1.257	0.0622
KK	30 PPM	97.50	9.460	7.700	1.360	0.0740
KC	0 PPM	85.25	6.785	5.277	1.012	0.0450
KC	10 PPM	87.75	8.155	5.887	1.150	0.0545
KC	20 PPM	90.25	8.857	7.362	1.327	0.0727
KC	30 PPM	99.75	9.562	7.850	1.410	0.0827
	LSD ±	115	10	8	2	0
	CV ±	83.287	76.673	72.433	73.185	62.821
	SEM ±	37.479	3.404	2.643	0.4903	0.0241

Table 2: Effect of Kinetin on seed yield and yield component of Cowpea cultivar (Kashi Kanchan and Kashi Unnati)

Variety	Treatment	No. of Pods/ Plant	No. of Seeds/ Plant	100 seed weight (gm)	Seed yield/ Plant (gm)
K.K	0 PPM	7.675	9.636	97.50	5.890
K.K	10 PPM	9.5	10.725	98.82	8.637
K.K	20 PPM	11.85	11.850	101.87	14.425
K.K	30 PPM	12.55	12.475	102.45	14.522
K.U	0 PPM	7.7	10.65	98.75	6.185
K.U	10 PPM	9.35	10.8175	98.92	8.7175
K.U	20 PPM	11.9125	12.1	102.05	14.725
K.U	30 PPM	12.67	12.675	103.3667	14.75
	LSD ±	13	14	128	13
	CV ±	69.758	77.075	81.336	58.709
	SEM ±	4.16805	4.7015	41.4815	4.3151

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