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Effect of Growth Regulator IAA on Vigna Radiata L. (Green Gram)

Pandey P.O[1], Valvi G. R[2], Mahajan, J.S[3]

[1,2,3]Department of Botany, Moolji Jaitha Autonomous College, Jalgaon, Maharashtra, India.

ABSTRACT

The present study deals with the experiment on green gram *Vigna radiata* L.
belonging to family Fabaceae. Contribution of mung to agriculture and daily life has been tremendous, thus to improve the yield of such nutritious pulse crop an attempt is made. For this, tray experiment was conducted. Healthy seeds of mung bean are taken and treated with growth regulator Indole-Acetic acid (IAA) in different concentrations compared with control. The growth parameter like days of germination, development of cotyledons, number of leaflets in (day- 4days,6days,8days) height of plants, maximum leaf length, weight of seeds ,number of seeds per pod etc. The results revealed that highest concentration of IAA gave better results, and 50% & 25% IAA helped to some extent improve yield of crop.

Keywords: *Vigna radiata* L., IAA, Yield, Fabaceae etc.

Introduction

The mung bean plant (*Vigna radiata L.)* belongs to family Fabaceae. It is found everywhere in tropical & subtropical region. An important feature of mung bean crop is that, it has the potential of producing higher yield depending on the genotype studied (Ullan *et al.* 2011). Nutrient elements are needed in relatively very small quantities for adequate plant growth production. Their deficiency may cause great disturbance in the physiological & metabolic processes involved in the plant (Babaeian *et al.* 2011). It is also referred to as **Green gram or Golden gram**. An important feature of the mung bean crop is ability to establish a symbiotic partnership with specific bacteria setting up the biological N_2 fixation in root nodules that supply the plant need for N (Mahmood & Athar 2008 Mandal *et al.* 2009). The plant suffers from excessive vegetative growth, poor harvest index, and low yield mainly due to poor pod setting in spite of profuse flowering. Flower as well as pod shedding is feature in this legume crop which is reflected in sink realisation. If these potential yield barriers could be alleviated by any means, then yield enhancement improvement in quality of green gram could be achieved. Protein malnutrition remains a major nutrition problem in Asia and affects children most severely (WHO, 2000; UNSCN, 2010). About 150 million children worldwide are underweight and 182 million are stunted. At least 70% of these children are in Asia. Meat is a good protein source, but is either excluded from vegetarian diets or unaffordable for poor households where protein and micronutrient deficiencies are most prevalent. However, mung bean is cheap source of protein, and an important nutritious dietary component of vegetarians in Asian countries especially in South-east Asia (Keatinge *et al.,* 2011).

Mung Bean Nutrients:

The Mung Bean is rich in mineral & vitamins. Chemical composition includes the protein, fatty acid, carbohydrates, vit.B_1& B_2, Beta, Carotean, calcium, Phosphor, Iron. Protein and rich in lysine, lucine, threonine but not rich in methionine, tryptophane, tyrosine. Mung bean skin contains 21 kinds of minerals rich in phosphorous ion. Other content include vitexin, B-sitosterol, 100gm mung bean contain protein 22.1gm, fat 0.8gm, carbon hydrate 59gm and heat 332k.

Reason for undertaking the problem

Salinity stress is a major constraint in the production of this crop where 50 mM NaCl can cause yield losses up to 70% (Saha *et al.,* 2010). The increased salinity of Arable land is expected to have devastating global effects, resulting in up to 50% land loss by the middle of the twenty-first century (Mahajan and, Tuteja 2005; Hasanuzzaman *et al.,* 2013).

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Materials and Methods:

To study the effect of IAA on growth and yield of green gram. The experiment was laid out in tray blocks of same sizes. Pots of block design with eight blocks carried out in cultivated home garden. Seeds are surface sterilized followed by washing with distilled water then treatment of growth regulator was given. The treatment were as under (1) control (No plant growth regulator applied (2) seeds soak with 25% concentration of IAA (3) seeds soak with 50% of IAA (4) seeds soak with 75% IAA & finally (5) last set was of 100% IAA treated seeds. Plants are subjected in same kind of soil providing similar condition of light, temperature humidity and irrigation. Observations in the growth character & yield component were recorded & compiled in table.

Observation Table

Sr.no	Morphological traits	IAA				Control
		25%	50%	75%	100%	
1	Days to germination	3	2	1	1	6
2	Development of cotyledon in days	5	4	3	3	6
3	No. of leaflets(2)in days	7	7	5	6	9
4	No. of leaflets(4) in days	11	10	12	10	13
5	No. of leaflets(6) in days	14	12	13	13	12
6	Height of plant(15 days)	12.5	10.8	10.9	10.5	9.2
7	Height of plant (30 days)	15	14.5	14.5	13.5	10.5
8	Max. Leaf length	5.6	5	5.7	5.5	5.4
9	Pod contains seeds	6	6	7	6	4
10	Weight of seeds	0.158	0.189	0.223	0.202	0.141

Table showing different morphological traits

Results & Discussion:

In order to understand the role of individual plant growth regulator in controlling mung bean growth, plants were grown in different concentration of (25%, 50%, 75%, 100%) IAA providing same environmental condition. The result reflected complex relation between plant type & growth regulators. Firstly it could be seen that germination take place faster in plant treated with IAA as compared to control. In addition to this in germinating period of the seeds also occurred a significant decrease in number of days to develop height of plant, cotyledon & leaflet in 15 days by the treatment with IAA 100% & 75%.

The maximum leaf length occurred in 75% (5.7cm) treated with IAA. In general the photosynthetic production is determined by physiological activity & size of photosynthetic, organ therefore both number & size of leaflets of mung bean plant can play important role in photosynthetic production. In the present experiment it is demonstrated that 75% IAA cause the rapid increase in number & leaf size. The maximum vegetative growth of plant is achieved in IAA treated crop as compared to control. It is clear from observation table. Initially for developing the number of leaflets, control plant responded faster while stage at 6 leaflets, treated plants responded faster and achieved the same vegetative growth rather more than control plant. According to Mahipat Singh Yadav & Sanjay Kumar Singh (2014), hence according to them maximum vegetative growth is observed in all IAA treated plant .The present result is in accordance with them. For number of seeds per pod all IAA treated plant gave same result. But during present study only 75% concentration of IAA produced maximum number of seeds i.e 7 per pod. Maximum seed weight is recorded in 75% & 100% IAA treated *Vigna radiata* plant which is 0.223%,0.202 respectively. The decrease in leaf number & size observed control. It is similar to the result of Mahipat Singh Yadav *&* Sanjay Kumar Singh (2014) of mung bean plant. Only vegetative growth of mung bean plant is influenced by different growth regulator, it is ensure if the reproductive growth of mung bean plant is also altered based on the computation relationship of photosynthate between vegetative & reproductive growth, then it may be successful to use growth regulator for controlling growth & improving yield production. However during present study the pod containing seeds also show positive response, maximum in treated with IAA than control. Maximum height of plant is achieved after 30 days in 25% IAA whereas; it reduces the cotyledon growth, leaf size & formation of leaflet etc, in addition to change in morphological characteristics after treating with IAA.

Conclusion:

The present study indicates the role of proper concentrations of growth regulator. Hence, from above study it may be suggested that for the growth of Green gram 100% and 75% concentration of IAA gave better results in all morphological traits and hence it is most suitable for improving the yield of crop.

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PHOTOPLATE- 1

Photograph of *Vigna radiata* L. Growth in different concentration of IAA in pot experiment