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Study of Effect of Seed Invigoration on Seed Germination, Seedling Growth and Pod Development In Mung Bean (*Vignaradiata* L.)

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Abstract

A study has been conducted in mung bean to determine the effect of different seed invigoration treatments for seed germination, seedling growing, flowering and development of pods. Two varieties of mung bean i.e., Gold and HUM-1L, were selected and seed had been treated with salt, GA_3, $CaCl_2$, KNo_3, Urea and NaOCl respectively. Treated seeds were grown in different pots atAgricultural Research Farm, School of Agriculture, Lovely Professional University, Phagwara, Punjab. Seed invigoration with urea followed by $GA_3$was found very effectiveforseedgermination with vigorous seedlings in both varieties, whereas seed treated with KNo_3 showed negative effect on germination and vigorous growth. During it has estimated that the response for invigoration was vary for genotype to genotype for each treatment. Seed treatment with urea showed better performance than rest the treatments for all characters observed. The present results clearly elaborate that the germination, vigour and crop productivity of revalidated seed lots can be improved by pre-sowing and invigoration treatments.
Key words: Urea, invigoration, yield, seed, treatment,germination, vigor

Introduction

Mung bean (*Vignaradiate*L.) is one of the important pulse crop and good rouse of protein in South East Asian Countries (Rao *et al.*, 2014). In Indian, mung bean is grown as a major pule after chick pea and pigeon pea. Green gram seed contains near about 25% protein, 1.3% fat, 60% carbohydrates and 3.7% ash (Choudhary *et al*., 2010 and Hussain*et al.*, 2011).Mung bean mainly grown kharif season, but now it is growing as summer crop on large scale. It is short duration crop, ready to harvest before 90 days after sowing. It fixes nitrogen in root nodules and has very importance as green fodder as well as forage crop (Mohammad*et al*., 2012).

Previous studies on seed invigoration indicate that some benefits are associated with pre sowing treatments for seed vigor enhancement, but there is dearth of information about the germination performance of primed seeds (Bharadwaj*et al.*, 2017). Synchronous germination and vigor in seedlings were directly affect the yield and quality of crop (Khan *et al.*, 2016). So it is necessary to study the effect of different seed invigoration and develop suitable techniques in order to improve mungbean seed germination capacity as well improve other yield and growth related traits to get more production. Improved seed invigoration techniques is using in many countries for better germination, vigor's growth and increase yield (Khan 1992, Lee and Kim 2011). Seed invigoration treatment is doing to

overcome the low productivity by improving germination and vigor in the seedlings (Sutariati*et al*., 2013). The objective of this study was to identify different useful invigoration methods in mung bean.

Material and Methods

Experiment location

The research experiment was conducted at Agricultural Research Farm, School of Agriculture, Lovely Professional University, Phagwara, Punjab during Kharif season of the year 2018-2019, July to September. Geographically, farm is situated 31.25'N latitude and 75'E longitude with an altitude of 232 meter above the mean sea level. Geographically, farm is situated 31.25'N latitude and 75'E longitude with an altitude of 232 meter above the mean sea level. It has annual rainfall of 1919.5mm, subtropical with cool winters, hot summers and a distinct rainy season. All the treated seeds were grown in different pots to maintain the uniformity for fertility and moisture.

Experimental material and treatments

Two varieties of mung bean *i.e*., Gold and HUM-1L, were selected and seeds were used to treat with different treatments. Six treatments had been given to both varieties as follow, salt, GA_3, $CaCl_2$, KNo_3, Urea, NaOCland control, one day before sowing of seeds. Application of water and all nutrient were carried out uniformly throughout the growing season in all the treated pots.

Collection of data

Data was collected for different characters viz., days to germination, days to flowering, powdery mildew resistance, vigor of plant, number of pods per plant, pod length and number of seeds per pod from all treated pots for both Gold and HUM-1L variety.

Result and Discussion

According to the results, all characters under study were affected by the treatments and difference over control (untreated seeds) and between treatments (Table 01). Days to flowering showed very significant difference in all the treatments over control. The seed treated with GA_3 showed early maturity (Gold- 26 days and HUM-1L-27 days) followed by urea (Gold- 29 days and HUM-1L-28 days), NaCl (Gold-33 days and HUM-1L-33 days). Seedlings showed different resistant level for powdery mildew, treated seeds with KNo_3 showed high level of resistance, whereas seeds treated with NaCl showed low resistance level for powdery mildew. It had been observed that the response for invigoration was vary for genotype to genotype for each treatment, variety Gold showed more resistance than HUM1L for disease. Seeds treated with Urea also showed positive effect for pod length,

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days to flowering and number seeds per pod. Use of KNo_3 in invigoration is showing positive effect on few traits and negative effect for traits *viz.*, days to germination and days to flowering.

Application of GA_3showed positive effect on germination of seeds, days to flowering and vigor of the seedling, whereas negative effect on number of pods per plant, pod length and number of seeds per pod.Plant vigor was found good in the treatment of urea followed by GA_3 and CaCl2 and poor vigor were observed in treatments of NaOCl and NaCl.

On the basis of result of all treatments it can be conclude that use of Urea, GA_3 and KNo_3 together is beneficial for germination, vigor, days to flowering, pod length etc. andthese results are in accordance, with the studies of Patel and Saxena (1994), Pourazar and Mirshekari (2015), Demir*et al.*, (1999), Hafeez (2011) and Vishwanath*et al.,* (2014).

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Table 01:

Treatment	Days to germination		Days to flowering		Powdery mildew attack		Vigor of plant		Number of pods per plant		Pod length		Number of seeds per pod	
	Gold	HUM1L	Gold	HUM1L	Gold	HUM1L	Gold	HUM1L	Gold	HUM1L	Gold	HUM1L	Gold	HUM1L
GA_3	7	6	26	27	Low	No	Good	Good	10	13	4	5	5	7
$CaCl_2$	6	6	33	35	Low	Medium	Normal	Normal	15	16	4	5	4	6
Urea	5	6	29	28	Low	No	Very good	Very good	22	24	6	6	8	8
KNo_3	7	8	36	36	Very low	No	Normal	Poor	15	16	6	7	7	9
NaOCl	6	6	34	34	Low	No	Poor	Poor	18	15	4	5	5	7
NaCl	5	6	33	33	No	High	Poor	Poor	20	18	5	6	6	7
Control	5	6	35	36	Low	High	Normal	Normal	12	14	5	6	4	5

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