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Effect of fungicidal seed treatment on yield parameters of cowpea

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Abstract
India is supremely based upon the agricultural productivity as well as the quantity of grains and pulses produced for fulfilling the food and fodder needs of the huge population. With the focus on production we need the seed treatment which refer to the application of particular agents (physical, chemical or biological) to the seeds before sowing with the motive to suppress, control or repel various pathogens, insects and pests that can attack seed, seedling or plant. Generally, it ranges from a basic dressing to coating and pelleting. The present study was undertaken with the view to accesses the impact of pre sowing seed treatment on yield and different characters related with it in cowpea. The different pre sowing seed treatments showed different responses against all the seed quality attributes. Three different fungicidal seed treatments were done namely, captan, vita-vax and Bavistin. Among all the treatments control exhibited the poorest performance for all seven seed yield related attributes.

Keywords: Seed treatment, pests, seed quality, growth, yield

Introduction
Seed is the most basic as well as vital input for sustainable growth of agriculture productivity and production rate as 90 per cent of the food crops are produced from seed (Schwinn, 1994) [16]. The role of seed is major in terms of agriculture in developing countries like India where a large section of the population and GDP (Gross Domestic Product) considerably depend on agriculture sector (Tyagi, 2012) [20]. But besides all, for best agricultural practices the quality seeds are required for good growth and higher yield. The seed-borne as well as early season diseases and insects create high loss consequences if are not managed properly on time. Today's agriculture is emphasised to produce more with lesser land, water and manpower. Cultural age-old environment friendly disease management practice involve sanitation, crop rotation, mixed cropping, sowing date adjustment, fallowing, summer ploughing, green manuring and composting etc. (Sanjeev Kumar, 2012) [15] in order to fight plant pathogens have already lost their acceptability and are being on the path of re-evaluation as a component of integrated pest management (Reddy, 2013) [14]. Various methods of chemical control including soil drench or foliar application has many sides limitation like high cost, selection specificity, effect on non-target organisms, pest resistance, resurgence of pests, biosphere pollution including food and feed, health hazards, human toxicity etc. (Rahman *et al*., 2008) [13]. The speed in well-developed and durable resistant varieties has been slow and unreliable in spite of tremendous advancement made in the field of plant genetic engineering (Reddy, 2013) [14].

The output of pulses in India is not balanced in pace with the country's demand. Over the last few decades, the pulse output and productivity have remained stagnant. This is mostly owing to legumes limited yield potential under irrigation, yield volatility, and acreage shift from pulses to cereals. Cowpea has the world's greatest yearly production, with over 4.3 million metric tonnes, and the grain is a good source of human protein, while the haulms are a significant source of cattle protein. It is also a source of revenue for many small farmers since it contributes to the long-term viability of agricultural systems and the enhancement of soil fertility in marginal land by providing ground cover and plant residues like as leaves and roots (Tripathi and Singh 2001) [19]. It is one of the major crops in semi-arid locations over Asia and Africa being tolerant to sandy soil and reduced rainfall. It's an important crop for farmers with less resources, and is well-suited to intercropping systems with other crops. The entire plant is fed to animals as fodder, and very popularly, its name Cow Pea is derived from its usage as cow feed. Mostly, the crop is planted as kharif crop, even though in some regions of the

country, it may also be grown as a rabi, spring, or summer crop. These all are a number of factors that affect the maximum yield from the crop grown including best sowing time, seed treatment methods, few modified agronomic practices and different foliar nutrient spray. Therefore, with the view to cover and deeply study all these important factors, the present study entitled Maximization of seed yield and quality in cowpea (*Vigna unguiculata* L.)" was planned.

Material and Methodology

The present investigation was carried out in the research farm and seed laboratory, Department of Seed Science and Technology, CCS Haryana Agricultural University (HAU), Haryana, India during year 2019 and 2022. The cowpea seed material comprised of the variety CS-88. The field experiment was conducted during kharif season. Cowpea collected seed samples were stored at room temperature of 25 °C. Three different sowings of were planned on 30 March (summer) (S_1), 30 May (S_2) and 30 June (kharif) (S_3) under recommended package and practices in a plot size of 12 m^2 (4.0 m x 3.0 m) maintaining the row to row spacing of 30 cm for each treatment in three replications by using split plot design. The treatments consisted of three seed treatments along with a control, as follows provided in the table number 1. A regular data of the pertaining temperatures of the entire experimental period was maintained.

Table 1: Following treatments were given to seed

Indication	Treatment
T_0	Control (Untreated seeds)
T_1	Captan @ 2 g/kg
T_2	Vitavax @ 2 g/kg
T_3	Bavistin @ 2 g/kg

Results and Discussions

The seed treatment before sowing is also one of the vital practices affecting the seed yield and quality in field crops. Planting under cool, moist soil conditions that are favourable for many soil-borne diseases, especially oomycetes, but unfavourable for seed germination and seedling emergence, damping-off disease incidence increases.

Table 2: Yield factors at different seed treatment

Code	Treatment (@ 2 g/kg)	No. of clusters/ plant		No. of pods /clusters		No. of pods /plant		Pod length (cm)/ plant		Pod weight (g)/ plant	
		2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
T_0	Control	3.44	3.31	1.78	1.89	6.55	6.47	11.75	11.61	129.24	127.73
T_1	Captan	3.53	3.55	2.08	2.06	7.02	6.95	13.31	13.14	156.59	155.13
T_2	Vitavax	3.45	3.47	2.04	2.00	6.97	6.82	13.07	12.86	146.70	144.13
T_3	Bavistin	3.53	3.50	1.97	1.92	6.94	6.78	12.97	12.65	139.25	135.60

T_0 -control (untreated seeds), T_1 – Captan @ 2 gm/kg, T_2–Vitavax @ 2 gm/kg, T_3 – Bavistin @ 2 gm/kg.

As presented in table 2. above, the effect of three seed treatments, with captan, vita vax and Bavistin compared with control was experimented during the year 2019 and 2022. Out of all the seed treatment performed Captan @ 2 g/kg was observed to be best in terms of all the criteria undertaken. It was observed that captan succeeded all with 3.53 and 3.55 average total number of clusters per plant, respectively, in the year 2019 and 2022. The average number of pods per cluster were observed to be 2.08 and 2.06, respectively, in the year 2019 and 2022. Maximum pod length was observed in case of captan with 13.31 and 13.14 cm length, in the year 2019 and 2022 respectively. Number of pods per plant, resulted with the values of 7.02 and 6.95 pods per plant, in the years 2019 and 2022. 156.59 and 155.13 g were the highest weight recorded. As per the above data maximum seed yield and quality was observed in seed treated with captan. The effect of the vitavax and Bavistin was also significant on various seed yield and quality parameters as compared to untreated seed. The reason behind this can be attributed to the good germination and protection of seedling from seed and soil borne pathogens at seedling stage which ultimately results in good plant stand. Correct application of the fungicide is also a big factor, required to obtain the plenty benefits. These benefits include improved seedling emergence, plant height, plant vigour, plant and root biomass through protection from seed-borne and soil-borne pathogens (Anderson and Buzzell 1982; Dorrance and McClure 2001; Guy *et al.*, 1989; da Silva *et al.*, 2017) [2, 4, 5, 3]. In addition, seed treatment helps in preventing seed transmission of seed-borne pathogens (Khanzada *et al.*, 2002) [7], protects above-ground plant parts from infection by air-borne pathogens early in the season hence reducing their sporulation levels (Sundin *et al.*, 1999) [18]. Maize seed in often treated with fungicides to reduce seed and seedling diseases (Agarwal and Sinclair, 1996; Mc Gee, 1981) [1, 9]. Captan was widely used, but newer products have largely replaced it (Pedersen *et al*., 1986; Munkvold, 2009) [12, 11]. The results were also supported by Srinivasan *et al*., 2017 [17], Haque and Mallarino, 2000 [6] in cowpea, Leisso, 2009 [8], Morshed *et al*., 2014 [10] in kabuli chickpea.

Conclusion

From all the data shared in the Table 2. it can be easily concluded that, seed treatment methods are very effective in terms of crop yield increment. All the treatments out-turned into good yield as compared to control (no treatment). Out of all the treatments undertaken for the study, i.e., captan, resulted in highest yield. All the factors related to yield of pod, were observed to be best in terms of seed treatment with captan. Henceforth, improvement in growth and yield attributers of cowpea is because the seed treatments were quite logical.

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