Available Online through
www.ijpbs.com (or) www.ijpbsonline.com

IJPBS |Volume 2| Issue 4 |OCT-DEC |2012|364-368

EFFECT OF SEED TREATMENTS ON SEED QUALITY ENHANCEMENT IN PIGEON PEA

S. EZHIL KUMAR

Department of Genetics and Plant Breeding,

Faculty of Agriculture Annamalai University, Annamalai Nagar

Corresponding Author Email: *sezhil_5000@yahoo.co.in

ABSTRACT

The experiment was conducted to study the effect of various seed treatments on seed quality enhancement in pigeon pea cv.VBN 2 at PG laboratory, Department of Genetics and plant Breeding, Faculty of Agriculture. Annamalai University, Annamalai Nagar. The seeds were subjected to fourteen different treatments including dry seed treatment (vasambu rhizome powder treatment, arappu leaf powder treatment, turmeric rhizome powder treatment, neem seed kernel powder treatment and thiram seed treatment), wet seed treatment (castor oil, neem oil, mustard oil and halopolymer treatments) and seed pelleting treatments (vasambu rhizome powder pelleting, arappu leaf powder pelleting, turmeric rhizome powder pelleting and neem seed kernel powder pelleting) and stored in polythene bag for assessment of seed germination, seedling dry weight, seedling vigour index and bruchid infestation. The results revealed that germination per cent, seedling dry weight, vigour indices were higher in seeds treated with thiram @ 5 g kg^{-1} of seeds as compared to all other seed treatments.

KEYWORDS

pigeonpea, thiram, seed storage.

INTRODUCTION

Pigeon pea (*Cajanus cajan* (L.) Millsp.) is one of the most important protein rich (23.6%) legumes of the semi-arid tropics. In India, it is the second most important pulse crop next to chickpea and it is grown under varied agro climatic conditions. In India pigeon pea is cultivated in an area of 3.5 million hectares with production and productivity of 2.4 million tonnes and 685 kg per ha respectively (2005-06). The low productivity is due to non-availability of high yielding varieties, hybrids, poor keeping quality of seeds and lack of storage facilities (Kariavaradaraju, 2000). Quality seed is most important for successful cultivation of crop and seed quality can be enhanced by various seed treatment techniques *viz.,* seed fortification, seed hardening, seed colouring, seed pelleting and seed polymer coating in which nutrients are applied to the seed as a pre-sowing treatment which enhances the viability and vigour of the seed and improves the productivity of the seed. Among the various seed treatments, seed coating and pelleting treatments improves the seed germination and seedling establishment. Pelleting is a pre-sowing physical seed management technique, in which nutrients and growth promoting substances are applied on the seed to enhance the seed-soil interfaces (Scott, 1989). Seed pelleting favours uniform germination, reduced seed rate, more resistance to pests and diseases, stress tolerance and nourishment to the seedlings (Nargis, 1995). Seed pelleting provides a package of effective quantities of growth stimulating substances in such a way that they can influence microenvironment of each seed and avoid wastages of nutrients. In addition, pelleting with leaf powders improve water holding capacity of the soil and improve the supply of nutrients to the germinating seed (Muruganantham, 1996). In the present study, various seed treatments *viz.,* dry seed treatments, wed seed treatments and seed pelleting were attempted to enhance the seed quality of pigeon pea.

MATERIALS AND METHODS

Genetically pure seeds of pigeon pea cv. VBN-2 obtained from National pulses Research Station. Vamban, Tamil Nadu. It was graded with BSS 5x5 sieve for getting homogeneity of seeds. The bulk seeds were imposed with following treatments.

T_1: Control,

T_2: Castor oil @ 5ml kg^{-1} of seed,

T_3: Neem oil @ 5ml kg^{-1} of seed

T_4: Mustard oil @ 5ml kg^{-1} of seed,
T_5: Vasambu rhizome powder dry pelleting @ 100 gm kg^{-1} of seed.
T_6: Vasambu rhizome powder dry treatment @ 5 gm kg^{-1} of seed.
T_7 : Arappu leaf powder pelleting @ 100 g kg^{-1} of seed
T_8: Arappu leaf powder dry treatment @ 5 g kg^{-1} of seed
T_9: Turmeric rhizome power pelleting @ 100 g kg^{-1} of seed
T_{10} :Turmeric rhizome power dry treatment @ 5 g kg^{-1} of seed
T_{11}: Neem seed kernel powder pelleting @ 100 g kg^{-1} of seed
T_{12}: Neem seed kernel powder dry treatment @ 5 g kg^{-1} of seed
T_{13} :Thriam dry dressing @ 5 g kg^{-1} of seed
T_{14} ; Halopolymer @ 5 ml kg^{-1} of seed.

The seeds were subjected to wet seed treatment, dry seed treatment and seed pelleting treatments. For wet seed treatment, the required quantity of edible and non- edible oils *viz.,* mustard oil, castor oil and neem oil (5 ml kg^{-1} of seed) and halo polymer @ 5 ml kg^{-1} of seeds were applied to the seeds by smearing with hand in a clean plastic container and shade dried for 6 hours. Dry seed treatment was carried out with required quantity of botanicals (arappu leaf powder, turmeric rhizome powder, vasambu rhizome powder and neem seed kernel powder @ 5 g kg^{-1} of seeds and thiram @ 5 g kg^{-1} of seeds were thoroughly mixed with seeds in plastic container. The seed pelleting was done with addition of adhesive @ 200 ml kg^{-1} of seed and were individually coated with arappu leaf powder @ 100 g kg^{-1} of seeds, turmeric rhizome powder @ 100 g kg^{-1} of seed and vasambu rhizome powder @ 100 g kg^{-1} of seeds. The pelleted seeds were dried under shade for two days and were evaluated for seed quality characters.

The germination test was conducted at the end of the germination period and evaluated as normal seedling, abnormal seedling and dead seeds and the germination was reported in percentage by adopting the following formula as per the standard procedure (ISTA, 1999).

Germination (%):

$$\frac{\text{Number of normal seedlings}}{\text{Number of seeds sown in germination}} \times 100$$

The root length shoot length and dry matter production was calculated as follows. Ten normal seedlings were selected at random and measured using measuring scale for root length (the length between collar region to the tip of primary root), the shoot length (the length from collar region to the tip of true leaves) and dry matter production of 10 $seedlings^{-1}$ (ten normal seedlings were dried at first in shade and then in hot air oven at 85°C for 48 hrs and then cooled in desiccator containing $CaCO_3$ and weighed in mg.

The vigour index (VI) was calculated by adopting the following formula Abdul – Baki and Anderson, (1973) and the values were reported as whole numbers.

VI= Germination (%) x total seedling length (cm).

The data obtained from experiments were analyzed for 'f' test of significance following the model as described by Panse and Sukhatme, (1985).

RESULTS AND DISCUSSION

The results of the study revealed that germination percentage was gradually decreased as the storage period increased. From the initial month of storage to the end of storage period, the seeds treated with thiram @ 5 g kg^{-1} of seeds (T_{13}) recorded significantly higher germination (63%) at eight months of storage, while (T_1) control recorded lower seed germination (50%) (Table 1). This may be due to the fungicide forms a film around the seed which acts as barrier and prevent the loss of quality of seeds by preventing external fungal infection resulting in better seedling growth. These findings are in conformity with the findings of Murthy and Raveesha (1996) and Vamadevappa (1998). Irrespective of seed treatments, decrease in germination per cent is due to ageing effect leading to depletion of food reserves and decline in synthetic activity of embryo and fungal invasion. This result is in accordance with findings of Merwade, (2000), Renugadevi *et al., (*2006) in cowpea. The seeding vigour index was gradually decreased as the storage period advances. From the initial month of storage to the end of the storage period, seeds treated with thiram 5 g kg^{-1} of seed (T_{13}) recorded significantly higher seedling vigour index (2056) at eight months of storage while, (T_1) control recorded least vigour index (1412) (Table 1). The enhanced vigour index is because of favorable effect of thiram. The fungicide forms a film around the seed preventing the external fungal infection. Similar results of fungal infection in chemical treated seed of soybean were noticed by Gupta *et al.*, (1993) and Vamadevappa, (1998). Decrease in vigour

index is due to decrease in germination percentage, seedling length and dry matter accumulation in the seedling. This result is in accordance with the findings of Dinesh and Deepshika, (2012).

The seed infestation percentage was gradually increased as the storage period increased. From the initial month of storage to the end of storage period, seeds treated with neem oil @ 5 ml $kg^{-1}$of seeds (T_3) recorded significantly lower seed infestation (18.88%), while the (T_1) control recorded higher seed infestation (46.88) (Table 1) and it is attributed that inhibitory effect of active principle of azadiractine in neem oil on the egg and adult of bruchids in storage. This finding was in accordance with Jacob and Sheela, (1990) in green gram; Choudhary, (1991) in soybean. Seed treatment with bavistin recorded higher germination per cent, vigour index, field emergence and low electrical conductivity compared to seeds treated with neem leaf powder and control at the end of nine months of storage period (Nagaveni, 2005). Cucumber seed treated with cerasin and thiram to protect from storage fungi has maintained higher germination (Bujdosa, 1979). Brinjal seeds treated with thiram produced maximum germination and vigour index after 18 months of storage (Selvaraj, 1986). Singh *et al.* (1996) reported that onion seeds treated with thiram @ 2 gm kg^{-1} of seeds and stored in polythene bag maintained higher germination after 6 months of storage with effective control of *Alteneria alternate*, *Rhizopus spp.* and *Fusarium spp*. Koteswararao *et al.* (1962) reported that seed treatment of chilli with thiram improved seedling emergence after 10 months of storage, significantly reduced shoot length throughout the storage period. The average initial shoot length was (22.43 cm) reduced to 21.13 cm after eight months of storage. After 8 months of storage T_{13} (thiram @ 5 g kg^{-1}) 23.64cm, T_3 (neem oil @ 5 ml kg^{-1}) of seeds recorded 20.22 cm, while the T_1 (control) recorded the least shoot length of 18.56 cm. This result is in accordance with Ramdoss and Sivaprakasam (1994) in cowpea.

The average seedling dry weight was decreased gradually with increase of storage period. The average initial seedling dry weight was 0.49 gm decreased to 0.44 g after 8 months of storage. T_{13} (thiram @ 5 g kg^{-1} of seeds) recorded higher seedling dry weight (0.45g) to T_1 (control) recorded the least seedling dry weight 0.32 g (Table 1). This result is accordance with Merwade (2000).

In the present investigation, irrespective of the treatments the seed quality parameters declined with increase of storage period. The average germination, root length, shoot length, seedling dry weight and vigour index at the beginning of the storage period were 90.36%, 13.65 cm, 22.43 cm, 0.49 g, 3261 which declined to 57.23%, 10.77 cm, 19.68 cm, 0.38 g &1746 respectively at the end of 8 th month of storage. This decreased in seed quality during storage is due to ageing effect, decline in synthetic activity of embryo and death of seeds due to fungal invasion (Gupta and Singh, 1993), disruption of membrane integrity causing leakage of inter cellular substances, which is responsible for reduction of seed germination during storage (Girase *et al.,* 2006)

CONCLUSION

The present study revealed that thiram coated seeds in general have deteriorated at slower phase over untreated that had been manifested on higher quality parameter over control. This is because very slow deterioration rate of coated seeds. In conclusion, the seeds coated with thiram @ 5 g per kg of seeds was found to be very effective in maintaining the quality of the seed.

Table 1. Effect of seed treatments on seed quality enhancement in pigeon pea (*Cajanus cajan* (L.) cv. VBN-2

	Germination		Root Length		Shoot Length		Seedling dry weight		VI		Bruchids infestation	
	M1	M8	M1	M8	M1	M8	M1	M8	M1	M8	M1	M8
T_1	88	50	12.84	9.91	21.33	18.56	0.40	0.32	3015	1412	0.00	46.88
T_2	89	57	13.10	10.28	22.51	19.94	0.41	0.33	3190	1741	0.00	30.00
T_3	92	61	14.44	11.31	23.10	20.22	0.55	0.42	3415	1935	0.00	18.88
T_4	90	58	13.30	10.58	22.24	19.56	0.49	0.38	3197	1741	0.00	32.22
T_5	91	57	14.22	11.24	23.07	20.21	0.54	0.41	3404	1788	0.33	33.00
T_6	90	56	13.24	10.23	22.14	19.64	0.49	0.39	3193	1681	0.00	34.77
T_7	90	57	13.59	10.27	22.31	19.61	0.48	0.38	3215	1717	0.55	32.00
T_8	89	56	13.14	10.38	21.87	19.32	0.50	0.39	3128	1671	0.00	32.66
T_9	91	61	13.72	10.81	22.76	20.00	0.48	0.38	3332	1889	0.22	27.88
T_{10}	90	56	13.47	10.74	22.33	19.41	0.48	0.37	3230	1677	0.00	29.33
T_{11}	90	56	13.88	11.17	22.71	19.64	0.51	0.39	3308	1739	0.22	20.77
T_{12}	90	56	13.64	10.92	21.69	19.17	0.54	0.41	3187	1698	0.00	23.11
T_{13}	92	63	14.91	10.88	23.64	20.91	0.57	0.45	3573	2056	1.00	28.55
T_{14}	90	56	13.51	10.90	21.98	19.18	0.44	0.35	3193	1691	0.33	34.66
T_{15}	91	57	13.79	10.94	22.81	19.84	0.45	0.34	3342	1961	0.20	31.22

RFERENCES

Bujdoso, G. (1979). The effect of seed dressing prior to storage on germination of cucumber. Zoldsegtermesztesi Kutato Intezetbulletinje, 13(13): 49-54

Girase, V.S.,V.D. Shende, A.S. Dumbre, R.S. Shaikh. (2006). Effect of packaging on germination and storability of soybean under ambient conditions. *Seed Research*, 34: 202-206

Gupta, A and D.Singh. (1993). Effect of fungicidal treatment on seed viability and mycoflora of stored vegetable seeds. *Seed Research*, 20: 270-275

ISTA (1999). International Rules for seed testing. *Seed Sci& Technol.,* **13**: 209-355

Jacqualine, A. and Selvaraj. (1988). Studies on storage of brinjal (*Solanum melongena* L.) seeds, I. Biocide treatments and containers for storage. *South Indian Hort.,* **36:** 313-317.

Karivaradaraaju, T.V. (2000) Paper on increasing the productivity of rice-fallow pulses. Tamil Nadu Agric. Univ., Coimbatore, India

Koteshwar Rao, O., K. Srihari Rao and P. Govind Rao. (1962). Effect of seed treatment of chilli with organic fungicides in improving germination. *Andhra Agric. J.,* **9:** 55-59

Merwade, M.N. (2000). Investigation on seed production techniques and storability of chickpea. *M.Sc. (Agri.) Thesis,* Univ. Agric. Sci., Dharwad

Murthy, Y.L.K. and K.A. Raveesha. (1996). Seed mycoflora of soybean in Karnataka. *Plant Disease Research*, 11(1):78-82

Muruganantham, K. (1996). Influence of seed pelletization of viability, vigour and production potential in rice follow cotton cv. MCU-7. *M Sc. (Agri) Thesis*, Tamil Nadu Argil. Uni. Coimbatore, India

Nagaveni, P.K. (2005). Effect of storage conditions, packing material and seed treatment on viability and vigour of onion seeds. *Ph.D. Thesis* (unpublished) submitted to University of Agricultural Sciences, Dharwad

Nargis, S. (1995). Influence of pelleting, magnetic treatments and radiation on the performance of differentially aged seeds in tomato (*Lycopesicum esculentum*) mill. cv. PKM. *M.Sc.(Ag.) Thesis,* Tamil Nadu Agricultural University, Coimbatore.

Panse, V.G. and P. V. Sukatme. (1985). Statistical methods for agricultural workers. ICAR publication, New Delhi, p. 359.

Renugadevi J, N. Natarajan, R. Rajasekaran and P. Srimathi. (2006). Bio-efficacy of promising botanicals against insect infesting cowpea. cv. Co 4. *Indian J Agric. Res.* 40(4):262-266

Singh, B., P. Singh, C.P. Vaish and R.P. Katiyar. (1996). Effect of various fungicides on viability of onion (*Allium cepa* L.) seed in storage. *Seed Res.,* 24(1): 61-63

Vamadevappa, H. (1998). Studies on seed viability and vigour in relation to storage in soybean (*Glycine max* (L). Merill). *M.Sc.(Ag) Thesis,* University of Agricultural Sciences, Bangalore, India.

***Corresponding Author:**
S. EZHIL KUMAR
Department of Genetics and Plant Breeding, Faculty of Agriculture Annamalai University, Annamalai Nagar
***Corresponding Author Email:**
sezhil_5000@yahoo.co.in