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Influence of Pre-Sowing Seed Management Techniques on Initial Seed Quality Parameters in Green Gram CV .Co 6 at Laboratory Condition

KEYWORDS: Greengram seeds, $MgSO_4$, Polymer, Carbendazim, Imdiacloprid

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ABSTRACT *In the present study, seeds were evaluated for their influence at laboratory condition both with existing seed treatment, seed hardening and newer seed management technique, designer seed that focused on integration of seed management techniques, pertaining to invigoration and protection, as the seed is known as the carrier of new technologies. The results of the study revealed that seeds hardened with $MgSO_4$ 100 ppm improved the germination (93 per cent) by three per cent compared to control (90 per cent), while that of designer seed (95 per cent) by five per cent. Likewise seedling vigour characters and field emergence also higher in seeds imposed with invigourative seed treatment.*

INTRODUCTION

Greengram (*Vigna radiata* L.) is a popular pulse crop of India because it is a rich source of protein (24%), carbohydrates (60%), fat (1.5%), amino acids, vitamins and minerals etc. It has wide adoptability and can be grown around the year in India. The options foreseen to increase the pulse production is development of high yielding varieties/hybrids and development for proper seed and crop management techniques specific to crop and varieties as the management techniques alone expose the full genetic potentiality of the produced hybrids and varieties. Quality seed is the key for successful agriculture, which demands each and every seed should be readily germinable and produce a vigorous seedling ensuring high yield. At present several seed enhancement techniques are available for quality upgradation. It has two goals; one is related to seed designing and other to seed functioning. Seed designing can be achieved by the seed management techniques viz., fortification, hardening, coating and pelleting. Various pre-sowing physiological and chemical seed treatment methods are available to increase the productivity. Pre-sowing seed hardening treatments with chemicals, nutrient solutions, growth regulators and botanicals have been developed as a potential agro-technique to induce drought tolerance without impairing the germination potential of seeds. A judicious and comprehensive package of crop specific seed management techniques starting from dormancy breaking treatments ,seed germination and vigour augmenting treatments, seed protection treatments and finally seed handling and conditioning treatments need to be developed from sustainable good crop growth and productivity (Sasthri and kalaivani,2010). Among several non physiological seed treatments, coating or pelleting can indirectly improved seed germination and seedling establishment. In the present study, seeds were evaluated for their influence at laboratory condition both with existing seed treatment, seed hardening (Anon, 1997; Anon,2005) and newer seed management technique, designer seed that focused on integration of seed management techniques, pertaining to invigoration and protection, as the seed is known as the carrier of new technologies (Agrawal,1995).

MATERIALS AND METHODS

Genetically pure, freshly harvested breeder seeds of greengram (*Vigna radiata* L.Wilczek) cv. CO 6 obtained from Agricultural Research Station, Bhavanisagar – 638 451 served as the base material for the study. The bulk seeds were imposed with hardening treatment with $MgSO_4$ 100 ppm (soaking in 1/3 volume of seed to solution ratio for 3h) as per CPG and the integrated seed management technique (as per suggested by Anon, 2009) designer seed (seed hardening with 100 ppm $MgSO_4$ for 3 h + coating with polymer @ 3 ml kg^{-1} of seed + carbendazim @ 2g kg^{-1} of seed and imidacloprid @ 1 ml per kg^{-1} of seed)..

The seeds hardened, designed as above along with untreated seeds were observed for the following seed quality and seedling characters at laboratory are germination (%), root length (cm),shoot length (cm), drymatter content (mg/ 10 seedlings), vigour index and field emergence (%).The data obtained from experiments were analysed for 'F' test of significance following the methods described by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The results of the study revealed that seeds hardened with $MgSO_4$ 100 ppm improved the germination (93 per cent) by three per cent compared to control (90 per cent), while that of designer seed (95 per cent) by five per cent. Likewise seedling vigour characters also higher in seeds imposed with invigorative seed treatment. In the present study, the root and shoot recorded 4.7 per cent and 3.3 per cent higher values in hardened seed and 9.1 per cent and 8.2 per cent in designer seed when compared to control, respectively.

Kamalam and Nair (1989) observed improvement in root and shoot growth of paddy seedling due to the earliness of germination and seedling growth in hardened seed. The increase in dry weight was claimed to be due to enhanced lipid utilization through glyoxalate cycle, a primitive pathway leading to faster growth and development of seedlings to reach autotropic stage well in advance of others and enabling them to produce relatively more quantity of dry matter (Jayaraj,

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1977). Henckel (1964) described the pre-sowing hardening or imbibitions and drying methods and furnished the results of physiological and biochemical changes in seed so as to get the characters that are favourable for drought tolerance. It was also argued that during soaking, seeds become physiologically advanced by carrying out some of the initial steps of that resulted in improved germination, seedling length, drymatter accumulation and vigour index (Vijaya, 1996; Natesan, 2006).

Coating is one of the non physiological seed treatments, that can indirectly improve the seed germination and stand establishment by extending its protection against seed mycoflora and thereby the natural seed deterioration (Scott, 1989; Kavitha, 2002) .According to Manjunatha *et al.* (2008), the higher germination and seedling vigour was due to increase in the rate of imbibition where the fine particle in the coating acts as a "wick" or moisture attracting material or perhaps to improve germination. An improvement in growth parameters of maize observed in pink polykote film coated seeds might be attributed to the nutrient effect present in coating material and also due to enhanced seedling establishment because of high metabolic activity of seed (Rathinavel *et al.*, 1999). Sherin (2003) and Sureshvegulla (2008) also reported an improvement in growth parameters due to polykote film coating in maize. Selvakumari (2010) in maize also reported that pre sowing hardening and designer seeds improved the seed quality characters.

Table 1. Influence of seed management techniques on initial seed quality parameters in green gram cv .CO 6 at Laboratory condition.

Treatments	G (%)	RL (cm)	SL (cm)	DMP (mg/ 10 seedlings)	VI	FE (%)
Control	90	15.9	19.5	170	3186	86
Hardened seed	93	17.1	20.3	176	3478	88
Designer seed	95	18.1	21.3	186	3743	91
Mean	92	17.0	20.3	177	3469	88
SE(d)	1.01	0.36	0.33	2.96	85.46	2.00
CD (P =0.05)	2.49	0.88	0.83	5.26	170.14	4.93

G – Germination, RL-Root length, SL- Shoot length, DMP-Dry matter production, VI-Vigour index, FE-Field emergence

The results of the present investigation also exhibited that designer seed recorded the maximum field emergence over hardened and untreated seeds The designerseed recorded 5.4 per cent increased field emergence over control and 3.2 per cent over hardened seed

Kavitha (2002) in black gram, Giang and Gowda (2007) in rice, opined that pre sowing hardening improved the initial field emergence and also the final productivity. Sorghum seeds slurry coated with 3g red polymer + 2g carbendazim + 1ml imidacloprid kg^{-1} of seed, increased the yield by 24.5% over control (Sarithadevi, 2004). Vijayakumar *et al.* (2007) in cotton reported that seed coating with polymer enhanced the productivity of seeds, while Natesan (2006) in blackgram, and Selvakumari (2010) in maize reported that designer seed, the integration of seed management techniques (hardening + coating + pelleting) improved the productivity of seeds.
Kamalan and Nair (1989) expressed that during soaking, seeds would become physiologically advanced by carrying out some of the initial steps of germination and the subsequent improvement in germinationality of these hardened seed could be due to fact that such advanced step in the germination process which on further placement for germination, remember the stage of initial imbibition step and continue from that stage for further growth and development. The improvement in field emergence could be attributed to activation of cells, which resulted in the enhancement of mitochondrial activity leading to the formation of more high energy compounds and vital biomolecules, which are made available during the early phase of germination (Dharmalingam *et al.*, 1988). The enhanced field emergence with coating of seeds was also reported by Begam (2001) in blackgram.

CONCLUSION

In line with the views, in the present study also, seed designed with seed hardening with 100 ppm $MgSO_4$ for 3 h + coating with polymer @ 3 ml kg^{-1} of seed + carbendazim @ 2g kg^{-1} of seed and imidacloprid @ 1 ml per kg^{-1} of seed (designer seed) recorded the highest initial seed quality characters under laboratory condition which were five per cent higher than control and three per cent higher than hardened seed.

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