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Influence of Polymer Coating on Nursery Management in Chillies

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ABSTRACT Studies were made to elucidate the influence of hydrophilic polymer coating with and without pesticides and DAP on seed and seedling quality characteristics of chilli cv. K2. The results showed that slurry coating of seed with polykote (3g kg^{-1} of seed) along with carbendazim (2g kg^{-1} of seed) and halogen mixture (3g kg^{-1} seed) enhanced the germination and vigour index values by 24 per cent, whereas, the pathogen infection was lessened by 1 per cent compared to uncoated seeds. This treatment also enhanced the field emergence by 29 per cent in the nursery sowing.

Key words: Polykote, fungicides, nutrients, germination, field emergence

Chilli (Capsicum annum), an important tropical vegetable crop, is raised in nursery beds before transplanting to main fields. The success of seedling at nursery largely depends on the initial quality of the seed. In recent times various quality enhancement treatments are given to the seeds as a presowing treatment. Seed coating is a presowing technique, where, an external material is applied on the seed which does not obscure its shape. Polykote is a film coating polymer normally applied over seeds without significantly increasing the size or weight of seed. This type of plasticizer polymers form a flexible film that prevent dusting off and loss of fungicide during handling and are readily soluble in water (hydrophilic), so as not to impede with normal germination [1].

The application of polymers to seed serves as an extra exterior shell in order to give the desired seed characteristics viz., quick or delayed water uptake and enhanced germination that would be beneficial for better emergence and establishment in the given environment [2, 3]. Film coating along with colourant is an emerging pre-sowing seed management technique, recommended for high value agricultural crops [1, 4]. Attempt was made in the present study to evaluate the influence of polykote the hydrophilic polymer on seed quality characteristics and seedling establishment at nursery level in chilli cultivar K2.

MATERIALS AND METHODS

Seeds of chilli cv. K2 obtained from Tamil Nadu Agricultural University, Coimbatore were coated with yellow coloured polykote both alone and with different bioactive chemicals as under:

T_0 - Control (uncoated)

T_1 - Polykote @ 3g kg^{-1} of seed

T_2 - Polykote @ 3g + carbendazim @ 2g kg^{-1} of seed

T_3 - Polykote @ 3g + DAP @ 2g kg^{-1} of seed

T_4 - Polykote @ 3g + Halogen mixture @ 3g kg^{-1} of seed

T_5 - Polykote @ 3g + carbendazim @ 2g + DAP @ 2g kg^{-1} of seed

T_6 - Polykote @ 3g + carbendazim 2g + Halogen mixture @ 3g kg^{-1} of seed

T_7 - Polykote @ 3g + Halogen mixture @ 3g + DAP @ 2g kg^{-1}

T_8 - Polykote @ 3g + carbendazim @ 2g + DAP @ 2g + Halogen mixture @ 3g kg^{-1} of seed.

For combination treatment the bioactive chemicals (carbendazim, halogen mixture and DAP) were mixed together and added to the polykoted seed and thoroughly mixed for 2-3

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minutes to avoid the aggregation of seeds and to have uniform coating. The coated seeds were air dried under shade for 24 h to bring back to its original moisture content. The treated seeds were germinated on top of paper method as per ISTA [5] and evaluated for germination and speed of emergence [6]. Seedling measurements on root and shoot length (cm) and drymatter production (mg 10 seedlings^{-1}) were observed after the germination period of fourteen days and the vigour index values were computed as per Abdul-Baki and Anderson [7]. The seeds were also observed for pathogenic infection, one month after the treatment adopting blotter technique [5]. The treated seeds were sown in raised bed in four replications of one hundred seeds each, and the field emergence was accounted in percentage after thirty days from seed sowing based on normal seedling growth. The seedlings were uprooted and measurements for seedling height, the number of leaves were made. The data recorded were analysed as per Panse and Sukhatme [8] adopting CRD for laboratory parameters and RBD for nursery observations.

RESULTS AND DISCUSSION

Significant results were obtained due to filmcoating for all the seed quality parameters evaluated at laboratory and nursery (Table 1). The imbibition rate was faster in single film coating by 11 per cent, whereas, it was enhanced to 34 per cent when the coating was combined with carbendazim and halogen mixture. Due to the faster rate of imbibition the subsequent expression of seed germination as speed of emergence was more, where the polykote was combined with carbendazim and halogen mixture. The faster emergence in polymer coated seed due to its hydrophilic nature was reported by West et al. [9]. Similar beneficial effect on germination due to simple polymer coating and with nutrients was reported by Zinin and Imamalier [10] in cotton. Faster rate of imbibition, favouring earlier emergence was reported by Ramesh et al. [11] in groundnut, Dadlani and Agrawal [12] in wheat and greengram, and Chachalis and Smith [13] in soybean. Not only the speed of emergence but the germination per cent and seedling vigour parameters were improved by this treatment. The improvement was 24, 20, 14, 32 and 23 per cent, respectively for germination, root length, shoot length, drymatter production and vigour index values compared to control. For the same seed quality parameters due to single polymer coating was 10, 14, 3, 19 and 12 per cent increase, respectively.

Table 1. Effects of seed treatments in combination with polykoting on seed quality parameters of chilli cv. K2

Treatment	Rate of imbibition	Speed of germination	Germination %	Root length (cm)	Shoot length (cm)	Seedling dry wt (mg 10^{-1})	Vigour index	Pathogen infection%	Field emergence %(30 DFS)	Plant height cm (30 DFS)	No. of leaves (30 DFS)
T_0-Control	41.9	2.52	66	5.80	5.58	0.031	843	7	48	5.05	5.0
T_1-Polykote	46.5	2.68	73	6.30	5.99	0.037	950	4	50	5.34	5.3
T_2-T_1+Carbendazim	48.7	2.42	80	6.56	6.02	0.037	1029	1	55	5.23	5.3
T_3-T_1+DAP	42.1	2.71	72	6.58	6.11	0.041	913	4	53	4.54	5.6
T_4-T_1+Halogen	52.8	2.82	76	6.21	6.06	0.039	938	3	57	6.14	5.5
T_5-T_2+DAP	52.9	2.64	79	5.93	5.83	0.039	926	2	59	5.28	6.1
T_6-T_2+Halogen	56.2	2.80	82	6.93	6.34	0.041	1044	1	62	7.89	7.0
T_7-T_4+DAP	54.0	2.48	73	5.81	5.83	0.039	872	4	57	6.00	6.3
T_8-T_5+Halogen	52.6	2.24	72	5.86	5.71	0.037	804	2	60	6.36	5.5
S.Em.±	0.14	0.05	4.57	0.32	-	-	78	0.23	0.13	0.64	0.32
CD (P=0.05)	0.28	0.11	9.61	0.68	NS	NS	163.8	0.47	0.26	1.35	0.68

In the present study, the fungal infection observed one month later from the treatment was more in uncoated seeds. The infection by the fungal pathogen Aspergillus niger was comparatively lower due to the preventive mechanism in seeds coated with fungicides. The seeds slurry coated with polymer combined with fungicide and halogen mixture had minimal pathogen infection of one per cent. Malarkodi [14] in pearlmillet reported that seed treatment with fungicide (Thiram) and halogen mixture, not only prevented the pathogen infection but also reduced the deterioration rate of seed.

The evaluation of the coated seed on seedling emergence at nursery showed that the seed slurry coated with polymer, carbendazim and halogen mixture improved the field emergence over uncoated seeds by 29 per cent. The beneficial effect might be due to combined influence of polymer along with fungicides in promoting early and healthier seedling. The plant height and number of leaves observed after thirty days was higher in seeds coated with polymer in combination with fungicide and halogen mixture. Sherin [1] observed similar improvement in field emergence in maize seeds and that was extended up to productivity.

Thus, the study highlighted the possibility for enhancing seedling vigour at nursery in the seeds of chilli by coating with polymer in combination with carbendazim and halogen mixture for production of elite seedlings.

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