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STANDARDIZATION OF POLYMER SEED FILM COATING TECHNIQUE

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Abstract: The study on standardization of optimum dosage and colour of seed coating polymer revealed that seeds film coated with 5g of little's blue polykote polymer per kg of seed performed better for seed quality attributes such as germination (96 %), shoot (10.7 cm) and root length (24.6 cm), vigour index (3383) and dry matter production (32 mg) compared to uncoated seeds. Seed coating also provides an opportunity to seed soil interface. Seed coating with hydrophilic polymer has been reported by many workers (Johnson et al., 2002) to offer exiting opportunity to promote the rapid and complete germination of seeds. Only a limited research has been performed on the addition of polymer compounds and hence developing a technique of seed coating to mustard seeds as a management tool to enhance seedling establishment under a wider range of environmental conditions will be highly useful.

I. Introduction

Seeds also require treatment for enclosing the protective chemicals, and nutrients added to the seeds without significant increase in the seed size or weight without the loss of chemicals, which can be achieved by polymer coating. Polymer coating enables accurate and even dosage of chemicals and reduces the chemical wastage. Hadas and Russo (1974) found that the polymer coating have high water conductivity and improved the seed water contact area. Seed water contact area expands on hydration which is important in enhancing imbibition (Collies and Hector, 1996). Seed coating has evolved from those which protect the seed from fungal and insect attack to a diverse and new range of coatings such as polymer. Therefore, it has been imperative to explore thoroughly the effect of seed coating on seed germination and seedling vigour precisely. In view of the above, a laboratory experiment was designed and conducted to assess the efficacy of seed coating polymer (little's polykote) on mustard seeds.

II. Materials and Methods

The seed coating polymer namely Little's polykotes obtained from M/s. Little's Oriental Balm and Pharmaceuticals Ltd., Chennai-17 was used for this experiment.

Treatment details

T ₁	-	Control
T ₂	-	Blue colour polykote @ 3g kg ⁻¹ of seed
T ₃	-	Blue colour polykote @ 4g kg ⁻¹ of seed
T ₄	-	Blue colour polykote @ 5g kg ⁻¹ of seed
T ₅	-	Red colour polykote @ 3g kg ⁻¹ of seed
T ₆	-	Red colour polykote @ 4g kg ⁻¹ of seed
T ₇	-	Red colour polykote @ 5g kg ⁻¹ of seed
T ₈	-	Yellow colour polykote @ 3g kg ⁻¹ of seed
T ₉	-	Yellow colour polykote @ 4g kg ⁻¹ of seed
T ₁₀	-	Yellow colour polykote @ 5g kg ⁻¹ of seed
T ₁₁	-	Pink colour polykote @ 3g kg ⁻¹ of seed
T ₁₂	-	Pink colour polykote @ 4g kg ⁻¹ of seed
T ₁₃	-	Pink colour polykote @ 5g kg ⁻¹ of seed
T ₁₄	-	Green colour polykote @ 3g kg ⁻¹ of seed
T ₁₅	-	Green colour polykote @ 4g kg ⁻¹ of seed
T ₁₆	-	Green colour polykote @ 5g kg ⁻¹ of seed
T ₁₇	-	Black colour polykote @ 3g kg ⁻¹ of seed
T ₁₈	-	Black colour polykote @ 4g kg ⁻¹ of seed
T ₁₉	-	Black colour polykote @ 5g kg ⁻¹ of seed

The following observations were recorded

Germination

Germination test was conducted with four replicates of hundred seeds each using between paper method in the germination room maintained at 25 ± 2°C and 96 ± 2% RH. The germination percentage was calculated based on the normal seedling evaluated on 7th day and it was expressed in percentage (ISTA, 1999).

Shoot length

Five normal seedlings were selected at random in each replication and length of the shoot was measured from the collar region to tip of the primary leaf and the mean value was expressed in cm seedling⁻¹.

Root length

From the above seedlings, the length of the root was measured from the collar to tip and the mean value was expressed in cm seedling⁻¹.

Vigour index

Vigour index value was computed using the following formula suggested by Abdul-Baki and Anderson (1973) and expressed as whole number.

Vigour index = Germination (%) x Total seedling length (cm)

Dry matter production

After measuring the root and shoot length, the five normal seedlings were shade dried for 24 h and then in a hot air oven maintained at 85 ± 1°C for 24 h. Then, they were cooled in a desiccator which contained calcium chloride for 30 min and weighed. The mean weight was expressed in mg 5 seedling⁻¹.

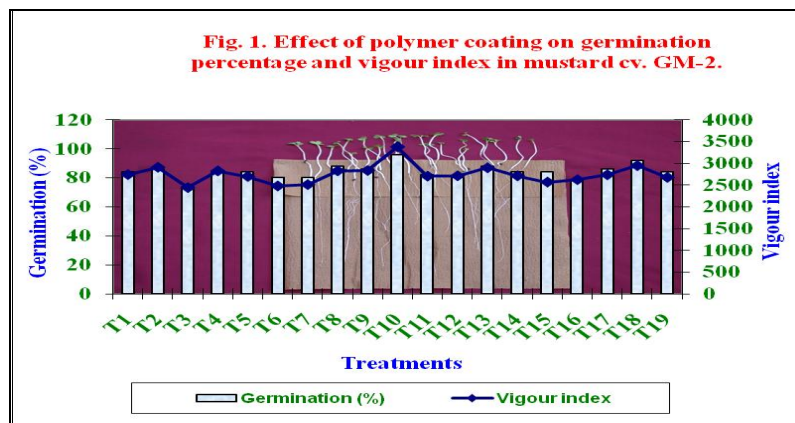
Effect of little's polymer film coating on germination percentage, shoot and root length (cm), vigour index and dry matter production (mg 5 seedling⁻¹) in mustard cv. GM-2.

Treatments	Germination (%)	Shoot length (cm)	Root length (cm)	Vigour index	Dry matter production (mg 5 seedling ⁻¹)
T1	84 (66.97)	9.3	23.3	2742	28
T2	86 (68.06)	9.9	23.8	2910	32
T3	74 (59.35)	9.2	23.7	2439	28
T4	84 (66.43)	9.6	24.0	2827	27
T5	84 (66.45)	9.8	22.2	2698	29
T6	80 (63.45)	9.4	21.6	2478	29
T7	80 (63.44)	9.5	21.8	2509	27
T8	88 (69.78)	9.4	22.7	2829	26
T9	86 (68.06)	9.5	23.5	2835	23
T10	96 (68.08)	10.7	24.6	3383	32
T11	82 (64.92)	9.5	23.5	2705	26
T12	80 (63.45)	9.5	24.4	2713	30
T13	88 (69.78)	9.9	23.0	2898	29
T14	84 (66.43)	9.2	23.1	2712	29
T15	84 (66.45)	9.0	21.6	2568	28
T16	78 (62.04)	9.2	24.4	2624	31
T17	86 (68.04)	9.3	22.4	2737	24
T18	92 (73.65)	9.0	23.0	2949	25
T19	84 (66.43)	10.0	21.9	2677	25
Mean	84.2 (66.58)	9.52	23.08	2749	27.8
SEd	1.973	0.235	0.487	118.53	0.764
CD (P=0.05)	3.995	0.476	0.986	239.96	1.548

(Figures in parenthesis are arc sine values)

III. Discussion

As these were no reliable reports available on polymer seed coating for mustard, initially an experiment was conducted to standardize the optimum dose and colour of polymer. In the present investigation, the seed coated with blue polymer @ 5 g kg⁻¹ seed (T₅) has registered 12.5 per cent higher germination over untreated control (Fig. 1).



The increase in germination may be due to increased imbibition by fine particles in the polymer which acts as a 'wick' or moisture attracting materials or perhaps, improved the seed soil contact. The use of hydrophilic

polymers as coating materials claimed to improve the movement of air and water to the seeds (Hedrick and Mowry, 1953) by aggregating soil clay particles adjacent to the seed. These processes might have preconditioned the seeds for prompt germination. In addition to improvement in germination, the seed coating increased the seedling growth and vigour as discernable by the relative measures of shoot and root growth. The seed coating with blue polymer @ 5 g kg⁻¹ increased the shoot, root, vigour index and dry matter production @ 13.08, 5.28, 18.95 and 12.5 per cent, respectively over the uncoated seeds. When the polykote dose is reduced, there was corresponding decrease in enhancement of above seedling growth attributes. Ruban *et al.* (1983) reported that polymer initially inhibited the activity of catalase and peroxidase and stimulated later on and thus, the seedling growth also.

References

- Johnson, G.A., D.H. Hicks and X. Duan. 2002. Use of temperature responsive polymer seed coating to control seed germination. **ISHS Acta Horticulturae**, 504: VI.
- Collies, G.N. and J.B. Hector. 1996. Germination of seeds as influenced by matric potential and by the area of contact between seed and soil water. **Aust. J. of soil Res.**, 4:145-164.
- International Seed Testing Association (ISTA). 1999. International rules for seed testing. **Seed Sci. & Technol.**, 27(Suppl.):27-32.
- Abdul – Baki, A.A. and J.D. Anderson. 1973. Vigour determination in soybean seed by multiple criteria. **Crop Sci.**, 13: 630-633.
- Hedrick, R.M. and D.T. Mowry. 1953. U.S. Patent No. 2,651,883 **In: advances in agronomy** vol. 42. Academic press Inc. p. 72.
- Ruban, I.N., N.L. Voropaeva and Yu V. Pakharukov. 1983. Mechanism of water absorption by polymer-coated seeds. USA national Cotton Council, 437-438.