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Short Communication

Seed coating polymer for *Bt*-cotton

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Cotton (*Gossypium hirusutum*) is cultivated commercially for domestic requirement and for export needs in nearly about 111 countries worldwide and hence is called the *"King of fibres"* or *"White gold"*. It enjoys premier position amongst all the commercial crops in India. It is also an important raw material, supplying about 65 per cent requirement of the Indian textile industry. The quality of cotton seed is an important parameter that would decide the field establishment and crop yield. Several seed quality enhancement techniques are currently used to ensure superior output. Seed coating provides an opportunity to supply the desired quantity of materials (fungicides, insecticides, micronutrients, colours and other additives) so that they can improve the resistance of seeds towards pest and diseases in the much warranted juvenile stage, besides, improves the germination and seedling growth as reported by Bharati and Srinivasan [1]. Film coating, a novel form of seed coating, makes the seed surface smooth which improves flowability and thereby makes the sowing operation much easier. These film formulations consist of a mixture of polymer, plasticizer and colourants [2] that are commercially available as ready to use liquids or as dry powders [3].

The present investigation was initiated in the Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Raichur with an objective to standardize the optimum dosage of a commercial polymer for seed coating of *Bt*-cotton.

The polymer used in the present study was Disco Agro DC Red L-603 procured from Incotec Pvt. Ltd. Ahmedabad, Gujarat. The experiment consisted of 5 different dosages of polymer (P) treatments along with control *viz.*, P_1: Control, P_2: 2 ml per kg of seed, P_3: 4 ml per kg of seed, P_4: 6 ml per kg of seed, P_5: 8 ml per kg of seed and P_6: 10 ml per kg of seed. The cleaned and graded hybrid *Bt*-cotton (Jadhoo, a commercial hybrid of kaveri Seed Company, Hyderabad) seeds were coated with polymer as per the above treatments after diluting with 30 ml distilled water in a rotary seed coating machine. Care was taken during coating to ensure that the seeds were uniformly coated and air dried properly under shade. The experiment was conducted in completely randomized design (CRD) with four replications. The observations on germination percentage as per ISTA [4], speed of germination by following the procedure of Maguire [5], shoot length; root length, seedling dry weight and vigour indexas suggested by Abdul Baki and Anderson [6], were recorded. The statistical analysis was done as per the procedure described by Sundararaj *et al.* [7].

Among the different dosages, significantly higher seed germination (87.00%) was recorded (Table 1) by coating the seeds with 10 ml polymer per kg of seed (P_6) compared to all other treatments and control (82.25 %). However, P_6 was on par with P_5 (polymer @ 8 ml/kg of seed) which recorded 86.75 per cent germination. According to Chachalis and Smith [8] the increase in germination percentage might be due to hydrophilic nature of the polymer that has increased imbibition rate which led to faster activation of cells resulting in the enhancement of mitochondrial activity leading to the formation of more high energy compounds and vital biomolecules, which were made available during the early phase of germination and reduced the imbibitional damage by regulating the water uptake. Similar results were reported by Imran baig [9] in soybean with the polymer dose of 5 g per kg of seed and in maize by Vanagamudi *et al.* [10] with polymer dose of 3 g per kg of seed. The results on speed of germination did not differ significantly among the different dosages of seed coating polymer. However, numerically, higher speed of germination (27.43) was recorded in P_6 compared to all other treatments and control (25.15).

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Significantly higher shoot length (14.38 cm), root length (16.50 cm) and seedling dry weight (58.1 mg) were recorded by coating the seeds with 10 ml per kg of seed compared to control (11.75 cm, 13.88 cm and 53.1 mg, respectively). However, it was found to be on par with 8 ml per kg of seed (14.00 cmand 16.13 cm and 57.8 mg, respectively).

Similar reports with respect to increase in shoot length, root length and seedling dry weight by coating with polymer were reported by Suma and Srimathi [11] in sesame by using polymer at 4 g per kg seed and in cotton by Kunkur *et al.* [12] by coating with 5 g polymer per kg seed.

Among the different dosages of polymers, 10 ml per kg of seed recorded significantly higher seedling vigour index (2686) compared to control (2108). However, it was on par with 8 ml (2613). This might be due to higher seed germination percentage, root and shoot length of seedling registered by the polymer coated seeds. Similar observations were made by Imran Baig [9] in soybean (3 g per kg of seed) and Suma and Srimathi [11] in sesame (4 g per kg of seed).

From the above results of the present investigation, as there was no significant difference for all the seed quality parameters by coating the seeds with either 10 ml or 8 ml per kg of seed, it can be concluded that for bulk treatment of *Bt*-cotton seeds, polymer @ 8 ml per kg of seed is found most ideal and economical as it has improved the germination and also seedling vigour which may help in stand establishment.

Table 1. Influence of seed polymer coating on seed quality parameters of *Bt* cotton

Treatments	Germination (%)	Speed of germination	Shoot length (cm)	Root length (cm)	Seedling dry weight (mg)	Seedling vigour index
P_1: Control	82.25 (65.08)*	25.15	11.75	13.88	53.1	2108
P_2: Polymer @ 2 ml per kg of seed	82.75 (65.47)	26.28	11.88	14.25	53.3	2162
P_3: Polymer @ 4 ml per kg of seed	82.75 (65.47)	27.10	12.88	14.88	54.3	2297
P_4: Polymer @ 6 ml per kg of seed	84.00 (66.43)	27.28	13.38	15.00	54.4	2383
P_5: Polymer @ 8 ml per kg of seed	86.75 (68.68)	27.33	14.00	16.13	57.8	2613
P_6: Polymer @ 10 ml per kg of seed	87.00 (68.87)	27.43	14.38	16.50	58.1	2686
Mean	84.25 (66.67)	26.76	13.04	15.10	55.1	2375
S.Em.±	0.39	0.50	0.30	0.21	0.51	32
CD @ 1 %	1.17	NS	1.22	0.87	1.51	97

* Figures in the parenthesis indicate arcsine transformed values
NS - Non Significant

REFERENCES

1. BHARTHI A AND J SRINIVASAN (2010). Polymer seed coating. Seed quality enhancement principles and practices. *Scientific Publishers*, pp. 233-256.
2. ROBANI H (1994). Film coating in horticultural seed. *Hort. Technol.*, **4**: 104-105.
3. NI BR (1997). Seed coating, film coating and pelleting. In:Seed industry and Agricultural development, Chinese Association of Agricultural Sciences, DOA, Ministry of Agriculture, Beijing, China Agriculture Press pp. 737-747.
4. ISTA (1999). International rules for seed testing. *Seed Sci. & Tech.*, **27**: 25-30.
5. MAGUIRE JD (1962). Speed of germination aid in selection and evaluation of seedling emergence and vigour. *Crop Sci.*, **2**: 176-177.
6. ABDUL-BAKI AA AND JD ANDERSON (1973). Vigour determination in soybean seeds by multiple criteria. *Crop Sci.*, **13**: 630-633.
7. SUNDARARAJ NS, MN NAGARAJU, RAMU VENKATA AND MR JAGANNATH (1972). *Design and analysis of experiments*, Univ. Agric. Sci. Bangalore pp. 148-155.
8. CHACHALIS D AND ML SMITH (2001). Hydrophobic polymer application reduces imbibitions rate and partially improves germination or emergence of soybean seedlings. *Seed Sci. & Tech.*, **29(1)**: 91-98.

9. IMRAN BAIG (2005). Effect of grading methods, fungicides and polymer coating on storability of soybean [*Glycine max* (L.) Merill]. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci. Dharwad, Karnataka (India).

10. VANANGAMUDI K, P SRIMATHI, N NATARAJAN AND M BHASKARAN (2003). Current scenario of seed coating polymer. *ICAR - Short Course on Seed Hardening and Pelleting Technologies for Rain Fed or Garden Land Ecosystems*, pp: 80-100.

11. SUMA N AND P SRIMATHI (2014). Influence of polymer coating on seed and seedling quality characteristics. *International Organization of Scientific Research J. Agric. Vet Sci.*, **7(5)**: 48-50.

12. KUNKUR V, RAVI HUNJE, NK BIRADAR PATIL AND BS VYAKARNHAL (2007). Effect of seed coating with polymer, fungicide and insecticide on seed quality in cotton during storage. *Karnataka J. Agric. Sci.*, **20(1)**: 137-139.