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Short Communication

Standardization of Seed Coating Polymer for Maize Hybrid (RMH-2)

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Maize (*Zea mays* L.) is the third important cereal crop next to rice and wheat in the world. It is being consumed both as food and fodder crop and also required by various industries in India. Maize production has increased with the adoption of improved technologies by the farmers. Use of fertilizers for soil fertility improvement has been encouraged as well as minimum or zero-tillage [1]. To provide higher quality seeds, many seed companies have developed new production technique called seed enhancement. The two important goals of seed enhancement are seed designing and seed functioning which can be achieved through seed polymer coating. This enhancement technology is the key interface between the two highly specialized industries *viz*., crop protection and the seed industry. Seed enhancement technique is a sophisticated process of applying precise amount of active ingredients along with a liquid polymer directly on to the seed surface without obscuring its shape [2]. It is normally used to apply a thin, uniform layer of polymer over seeds without significantly increasing seed size and weight. Since the coatings are very thin, multiple coatings of various ingredients can be done effectively.

Seed quality enhancement through seed polymerization is the application of physical, physiological, biological and chemical agents to the seed in order to enhance the physical, physiological, biochemical and health qualities of seed. At present, in Indian agriculture, different seed treatments are imposed on crop seeds for a variety of purposes namely for an improvement of field stand and productivity [3]. Seed polymerization is a physiological method of seed invigoration that enriches the endogenous level of newly bioactive substances, there by better establishment and improved crop productivity can be achieved. Hence, experiment was conducted with an objective to standardize the polymer dosage for maize hybrid (RMH-2).

An experiment on standardization of polymer dosage for seed treatment of maize was carried at the Department of Seed Science and Technology, College of Agriculture, UAS, Raichur. The experiment consisted of six different concentrations of polymer *viz*., P_1: control, P_2: 2 ml, P_3: 4 ml, P_4: 6 ml, P_5: 8 ml and P_6: 10 ml per kg of seed. The cleaned and graded seeds were coated with polymer at different concentration after diluting with 60 ml (per kg of seed) distilled water by using drum seed coating machine, subsequently seeds were air dried overnight to safe moisture content and used for seed quality parameter analysis.

Experiment was laid down in completely randomized design [CRD] with four replications. The fresh and untreated seeds of pre released maize hybrid (RMH-2) were obtained from the department of Genetics and Plant Breeding, College of Agriculture, Bheemarayanagudi, Yadagir district and polymer used in the present study was Disco Agro DC Red L-603 procured from Incotec Pvt. Ltd. Ahmedabad, Gujarat. The observation on germination (%), shoot length (cm), root length (cm), seedling dry weight (mg), speed of germination and seedling vigour index were recorded by adopting standard procedures [4]. The mean data of the experiment were statistically analyzed by adopting statistical methods [5]. The critical differences were calculated at one percent level of probability wherever 'F' test was found significant for various seed quality parameters under study.

The results showed that the germination (%), shoot length (cm), root length (cm), seedling dry weight (mg),

speed of germination and seedling vigour index were significantly influenced by the polymer coating are presented in table 1. The rapid, uniform and early germination is a prerequisite for good establishment and survival of the seedlings in the field of crop species. In the present investigation, germination was observed due to polymer treatment @ 6 ml per kg of seed (P_4). It was ascertained that germination percentage was significantly higher in P_4 (97.75 %) over control (95.00 %). However the seeds treated with 6 ml polymer per kg of seed (Plate 1) was significantly superior over all the treatments followed by 4 ml polymer per kg of seed (96.25 %). The polymer treatment can increase the germination by 2.89 percent over the control, this might be due to increase with quantity of water used to dissolve the polykote, maximum increase in water uptake and increased in imbibition rate which is in accordance with the findings in soybean [6]. The increase in imbibition rate might be due to the hydrophilic nature of the polymer that has increased imbibition rate which led to faster activation of cells, which results 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 imbibition damage by regulating the water uptake [2].

In the present investigation, significantly longer shoot and root length (14.50 and 21.80 cm respectively) were recorded in the seeds treated with polymer at the rate of 6 ml per kg of seed (P_4). However, P_4 was on par with P_5 (13.88 cm) in shoot length and for root length P_4 is on par with P_5 (18.95 cm) and P_6 (19.23 cm). The lower shoot and root length was recorded in P_1 (control) (12.50 and 16.13 cm, respectively). The increase in shoot and root length due to 6 ml polymer treatment was found to be 16 percent shoot length and 35.15 percent root length over the control. The improvement in shoot and root length might be due to enhanced metabolic activity resulted in early germination as reported in maize [7] and rice [8].

Significantly highest seedling vigour parameters *viz.*, seedling dry weight (169.75 mg), speed of germination (16.00) and seedling vigour index (3549) as compared to control were also observed in seeds coated with 6 ml polymer per kg of seeds. The increases in seedling dry weight, speed of germination and seedling vigour index was 5.76, 13.71 and 30.47%, respectively. The increase in seedling vigour might be due to enhanced metabolic activity in the treated seeds, thereby increased utilization of food reserves leads to synthesis of new compounds resulting in quicker emergence of radicle with increased accumulation of dry matters. The similar findings also reported in maize [7]. From this study, it can be concluded that, the polymer at the rate of 6 ml per kg of seed is most ideal, safe and economically feasible for maize.

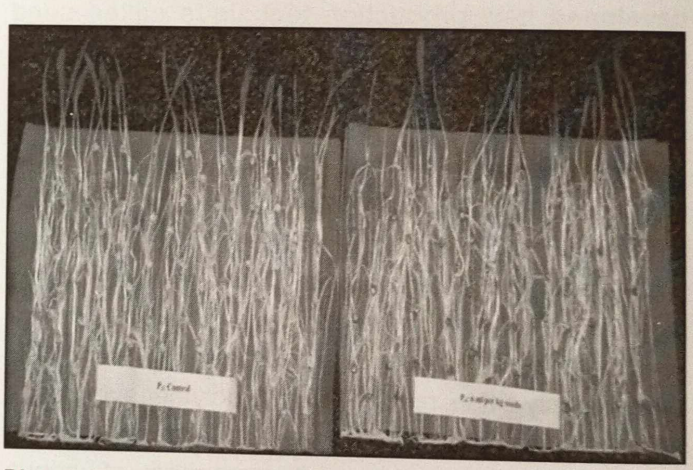

Plate 1. Effect of seed coating polymer on germination (%) of maize

Table 1. Effect of seed coating polymer on seed quality parameters of maize

Treatment	Germination (%)	Shoot length (cm)	Root length (cm)	Seedling dry weight (mg)	Speed of germination	Seedling vigour index
P_1: control	95.00	12.50	16.13	160.50	14.07	2720
P_2: 2 ml per kg of seed	95.50	13.25	17.80	163.50	14.33	2965
P_3: 4 ml per kg of seed	96.25	13.38	18.05	163.50	14.50	3025
P_4: 6 ml per kg of seed	97.75	14.50	21.80	169.75	16.00	3549
P_5: 8 ml per kg of seed	95.00	13.88	18.95	164.56	14.83	3119
P_6: 10 ml per kg of seed	95.75	13.13	19.23	164.13	14.88	3098
Mean	95.88	13.44	18.66	164.32	14.77	3078
SEm(±)	0.43	0.33	1.04	1.39	0.29	107
CD (p=0.01)	1.27	0.98	3.08	4.14	0.85	319

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