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Efficacy of botanicals and biofertilizers in sesame seed treatment

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Abstract
Sesame (*Sesamum indicum* L.) an ancient and third main oilseed crop after Groundnut (*Arachis hypogeae* L.) and Rape seed (*Brassica campestris* L.) grown in India. It occupies an area of 24.37 million hectares and total production of 208.71 million tonnes with productivity of 856 kg ha-1.
In any crop, seed is the basic input in agriculture and its supply of to the farmers is essential to attain self-sufficiency. Seed pelleting is the easier and a common technique followed in direct sown crops as it needs initial vigour for relentless crop growth and development. Pelleting provide a medium to construct package of materials which will help to influence micro environment of each seed by supplying nutrients from the earlier stages of the crop.
This study was aimed to ascertain the outcome of seed pelleting on different sesame varieties and their yield attributes and yield. Usually seeds vary in size, shape and colour, which leads to difficulty in precision seeding and uniform plant spacing. Physical seed enhancement techniques like seed pelleting results in more rapid and synchronous germination across seedbed environment particularly when their seed size is very small. The bio-fertilizers stimulate the growth and there by increased the survival rate of planted seedling. The hike in germination of seeds pelleted with bio-fertilizers might be due to the increased cytokinin production which actively involved in cell division. Pelleting can indirectly improve seed germination and stand establishment, while nutrient pelleting enrich the rhizosphere region with macro and micro nutrient triggering the vegetative growth of seedling as well to the improvement in zone specific microbial activity. From the present study it is revealed that seed pelleted with Neem leaf powder 760 g + Azospirillum 120 g + Phosphobacteria 120 g + 10% Maida gruel registered maximum plant height of 126.7 cm, No. of capsules (58.5), No. of Seeds per capsule (58.5) and seed yield of 530 kg/ha compared to control (Plant height (112.6 cm), No. of capsules (51.3), No. of Seeds per capsule (51.3) and seed yield of 375 kg/ha.

Keywords: Sesame, azhospirillum, phosphobacteria, neem leaf powder, seed pelleting

Introduction
Seed pelleting is the process of packaging *effective* quantities of foreign materials to increase a standard size, shape and weight of the seed, used for precision sowing/mechanical sowing. It can be used to pack an inoculants, growth regulators, protectants, nutrient, herbicide and hydrophilic substance as well as to increase supply of oxygen. Pellet can have a colour so that birds and small animals cannot recognize the seeds. Sesame plays a pivotal role in the world's oil production as a result of high quality with oil content ranging from 40-60%.
Seed pelleting technique is followed in direct sown crops in order to enhance the initial seed vigour. By seed coating along with micro and macro nutrients being included further facilitates addition of pesticides to protect insect pest and diseases at initial stages of crop growth. Increased awareness among farmers and push towards organic agriculture, inclusion of plant products under seed pelleting technology via agricultural research is gaining importance.
Seed pelleting plays a significant role in seed production but the rate of adoption of these technologies by the farmers remains notably low and is still insufficient to have real impact on rainfed cultivation. By keeping afore said in view, the study was constructed to evaluate the effect of seed hardening and seed pelleting on the seed quality parameters, yield attributes and yield of sesame.

Materials and Method
Genetically pure sesame seeds cv. TMV 7 released from Oilseeds Research Station, s.

Tindivanam were used for conducting the study. Field trials were conducted at Oilseeds Research Station, Tindivanam during 2017-18. Bulk seeds were pelleted with Neem leaf powder (760 g) and biofertilizer such as Azospirillum (120 g) and phosphobacteria, @120g kg-1 of seeds using maida 10 per cent as an adhesive and shade dried for a day and were evaluated for the seed and seedling quality characters along with control as detailed below.

T1 – Control

T2 – Seed pelleted with Neem leaf powder (760 g) and biofertilizer such as Azospirillum (120 g) and phosphobacteria, @120g kg-1 of seeds using maida 10 per cent as an adhesive.

Fig 1: Pelleting ingredients

Fig 2: Pelleted seeds

Result

The recommended package of practices has been adopted for both treated as well as control and the result has been summarized in the below tables.

Table 1: Effect of pelleting treatment on plant height (cm), No. of branches /plant and No. of seeds/capsule in sesame cv. TMV 7.

Treatments	Plant height (cm)	No. of branches/ plant	No. of capsules/ plant	No. of seeds/ capsule
T1 - Control	112.6	6.4	97.2	51.3
T2- Pelleted	126.7	7.6	104.1	58.5

Table 2: Effect of pelleting treatment on 1000 seed weight, Seed yield, Gross cost, Profit and BC Ratio in sesame cv. TMV 7.

Treatments	1000 seed weight (g)	Seed yield (kg/ha)	Gross cost	Profit	BC ratio
T1 - Control	4.20	375	21,000/-	30,000/-	1.43
T2- Pelleted	4.41	530	22,000/-	42,400/-	1.93

Table 3: Effect of pelleting treatment on resultant seeds quality in sesame cv. TMV 7.

Treatments	Germination %	Root length (cm)	Shoot length (cm)	Vigor index
T1 - Control	94	8.9	7.1	1504
T2- Pelleted	100	10.6	8.5	1910

Inference: From the above table it is inferred that T2 registered maximum No. of capsules /plant (104.1), 1000 seed weight (4.41g), seed yield/ha (530 kg), Profit (Rs.42, 400/-) and BCR (1.93) compared to control. Similar trend was also observed in quality of resultant seed also T2 registered highest vigour index value compared to treatment.

Fig 3: Non pelleted (Control)

Fig 4: Pelleted seed –field view

Discussion

In India it is certain that green revolution played a significant role in solving the food crisis prevailed in the last four decades. As a drawback the extensive use of chemical fertilizer usage raised from 1.54 million at 1967-68 to 17.31 million tonnes in 2002-03 nearly eleven folds and food production quadrupled from 50 million tonnes to 200 million tonnes. The technology from green revolution is extremely exploitative and results in ill effects on natural resources sustainability. Moreover, the increased demands for fertilizers has increased to 28 million tonnes from current 17 million tonnes and pesticides from 0.08 million tonnes to 0.15 million tonnes. The higher utilization of these costly inputs is not certain to show increased food productivity and further deteriorates the quality of food consumed. As a result, green revolution has weekend ecological base by degradation of soil and water which eventually in turn affect the people.

From the reports of Ponnusamy *et al.* (2003) [3] seed pelleting with macronutrients (120 g/DAP/kg seed) documented higher yield (7.20 kg/plot) with 93% seed recovery and improved germination percentage of 95% in blackgram. Prakash *et al.* (2015) [4] recorded better seed quality parameters when influenced by fly ash treatment in general and treatment @ 250 g kg-1 fly ash treatment at 5% or 10% gum Arabica (adhesive) resulted best over other treatments. Kamaraj *et al.* (2017) [1] concluded that, sesame seed cv. VRI 1 hardened with 2% KH2 PO4 and pelleted with halo polymer @ 2g kg-1 of seed showed higher seed yield.

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