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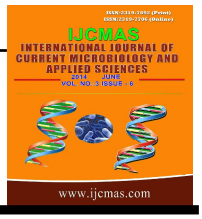

Original Research Article

Influence of Biofertilizer pelleting on seed and seedling quality characteristics of *Sesamum indicum*

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Pelleting, biofertilizer, sesame, seed quality characterstics

A B S T R A C T

The studies on pelleting with *Azospirillum*, *Phosphabacteria*, Azophos and mycorhiza @ 50 g kg^{-1} seed using maida 10 per cent as adhesive revealed that the germination was improved by 4 to 6 per cent, while the seedling quality characters in terms of seedling growth had been improved by 30 and 22 per cent in *Azospirillum*, 26 and 21 per cent in *Phosphobacteria* and 29 and 25 per cent in Azophos compared to control. Studies on seed pelleting with different micronutrients such as $ZnSO_4$, FeSO4, $CuSO_4$, $MnSO_4$, Borax @ 300 $mgkg^{-1}$ of seeds using Azospirillum as filler material and maida 10 per cent as an adhesive revealed that among the micronutrients, the performance of $MnSO_4$ (300 $mgkg^{-1}$ of seeds) was the highest which recorded 9 per cent higher germination than control. The hike in germination was also supported by the hike in the evaluated vigour parameters viz., seedling length, drymatter production and vigour index. Storability of seeds evaluated after 4 months of storage also confirmed the better performance of $MnSO_4$ pelleted seed which recorded 9 per cent higher germination than control.

Introduction

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 (Peter halmer, 2003). It also prevents the labour and material loss involved in basic seed agronomic technique wise viz., gap filling and thinning. Balaji (1990) in sunflower, Wankhade *et al.* (1992) in groundnut and Balamurugan (2002) in sesame also opined the better suitability of pelleting technique for enhanced field establishment and productivity in oilseeds.

For achieving proper protection, enhanced production and invigoration of seeds,

application of several seed enhancement technique as detailed above are recommended. But on need of cumulative benefits of each and every treatment, there is a need for sequencing the seed treatments one after the other. Sundaralingam *et al.* (1999) opined that physiological seed treatment should be followed with physical treatment. It was also reported that sequencing of seed treatment is an effective solution for improvement of crop establishment in cotton (Anon, 2004).

Materials and Methods

Genetically pure seeds of Sesamum (*Sesamum indium*.) cv. CO1 obtained from Department of oilseeds, TNAU, Coimbatore, formed the base material for the study. The field experiments and laboratory experiments were conducted at Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore (11° N latitude and 77°E longitude with an altitude of 427 m above mean sea level) during 2004-2005.
Bulk seeds were pelleted with different biofertilizer such as A*zospirillum*, *phosphobacteria*, A*zophos*, *Mycorhiza* and *Azatobacter* @50g 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.

100 seed weight (mg)

Eight replicates of hundred seeds were drawn from each treatment, weighed in sensitive electronic balance and expressed in milligrams (ISTA, 1999).

Germination (%)

Four replicates of hundred seeds were sown in sand medium and kept under the test conditions of 25° ± 1°C and 95° ± 3 per cent relative humidity maintained in a germination room illuminated with fluorescent light. After the test period of seven days the normal seedlings were counted and the mean values expressed as percentage (ISTA, 1999) to the total number of seeds placed for germination.

Root length (cm)

At the time of germination count, ten normal seedlings were taken at random. The length between the collar and tip of the primary root was measured as root length and the mean length expressed in centimeter.

Shoot length (cm)

From the ten seedlings used for measuring the root length, the length between collar and tip of the primary shoot was measured as shoot length and the mean value expressed in centimeter.

Drymatter production (mg 10 seedlings^{-1})

Ten normal seedlings from the germination test were selected at random, dried in a hot air oven maintained at 85°C for 48 h and cooled in a desiccators for 30 minutes, and weighed in an electronic digital balance. The mean weight was expressed as dry matter production 10 seedlings^{-1} in milligram (Gupta, 1993).

Vigour index

The Vigour index values were computed, adopting the procedure of Abdul-Baki and Anderson (1973) as given below and expressed as whole number.
Vigour index = Germination (%) x Total seedling length (cm)

Electrical conductivity (dSm^{-1})

Four replicates of fifty seeds were taken at random from each treatment, prewashed with deionised water to remove the adhering chemicals and soaked in 50 ml of deionised water for 12 h at room temperature. The seed steep water was decanted and measured for electrical conductivity in a digital conductivity meter having a cell constant of 1.0. The conductivity values were expressed in decisiemens (Presley, 1958).

Germination after storage (%)

The seeds were stored in cloth bag upto a period of 4 months and were evaluated for the germination percentage.

Results and Discussion

Highly significant difference was noticed due to biofertilizer pelleting seed treatments for all the evaluated seed and seedling quality characters (Table 1).

The ecofriendly production technique for maximisation of quality seed yield necessitates the use of organic biofertilizers in the place of inorganic fertilizers.

The researchers pointed out that inoculation of biofertilizers stimulate the growth (Swaminath and Vadiraj, 1988) and enhance the uptake of N (Chang *et al.*,1986), P (Delcruz *et al*., 1988), K (Huang *et al*., 1985) and other micronutrients (Vinayak and Bagyaraj, 1990) and there by increased the survival rate of planted seedling. In the present study seeds were pelleted with *Azospirillum*, *Phosphabacteria*, Azophos and mycorhiza @ 50 g kg^{-1} seed using maida 10 per cent as adhesive.

Table.1 Influence of biofertilizer pelleting on seed and seedling quality characteristic
(Figures in parentheses are arc sine transformed values)

Biofertilizer @ 50 g kg^{-1} seed	**100 seed weight (mg)**	**Germination (%)**	**Root length (cm)**	**Shoot length (cm)**	**Drymatter production 10 seedling^{-1} (mg)**	**Vigour index**	**Electrical conductivity (dSm^{-1})**	**Germination after 4 months (%)**
Azospirillum	328	86 (68.03)	11.5	7.6	44.1	1643	0.12	81 (64.16)
Phosphobacteria	329	84 (66.42)	11.0	7.5	42.1	1554	0.11	76 (60.67)
Azophos	326	84 (66.42)	11.4	7.9	40.0	1587	0.10	76 (60.67)
Mycorhiza	324	81 (64.16)	11.4	7.1	42.5	1498	0.13	78 (62.03)
Control	304	80 (63.43)	8.1	5.9	38.5	1120	0.08	75 (60.00)
CD (P=0.05)	**2.461**	**1.409**	**0.585**	**0.112**	**0.166**	**1.819**	**0.023**	**1.050**

The seeds pelleted with *Azospirillum*, *Phosphabacteria* and Azophos just enhanced the germination by 6, 4 and 4 per cent while mycorhiza just to 1 per cent compared to control. But an improvement of 3 to 7 per cent were evident in 100 seed weight when seeds were pelleted with biofertilizers compared to control. The seedling quality characters in terms of seedling growth had been improved by 30 and 22 per cent in *Azospirillum*, 26 and 21 per cent in *Phosphobacteria* and 29 and 25 per cent in Azophos compared to control. Similarly vigour index also has been improved by biofertilizer treatment compared to control.

The hike in germination of seeds pelleted with biofertilizers might be due to the increased cytokinin production which actively involved in cell division (Neilands,1981) and production of growth regulating substances like auxin, GA and cytokinin (Kucey,1988).Thus the study expressed that pelleting of seeds with *Azospirillum* enhanced the seedling vigour of seeds and the treated seed also could be stored well upto 4 months.

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