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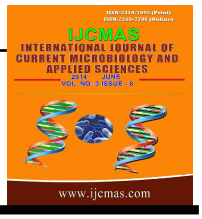

Original Research Article

Influence of size grading on seed and seedling quality characteristics of *Sesamum indicum*

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A B S T R A C T

Keywords

Size grading, seed quality character, sesame, seed recovery

Seed grading is the important practice for better crop establishment and to improve efficiency of planting ratio in field and also useful in separation of quality seed in a seed lot. In this context The present study on tracing the influence of size grading using BSS hand sieve with three sieves of 12 x 12, 14 x 14 and 16 x 16 size. The results revealed that seed recovery in 14 x 14 sieves was higher than the seeds retained in BSS 12 x 12 and BSS 16 x 16 sieves but the quality of seeds retained in BSS 14 x 14 sieves was higher than the Minimum Seed Certification Standard level for germination. Hence on grading of Sesamum seed with cleaner cum grader BSS 12 x 12 could be the first screen and BSS 14 x 14 could be selected as second screen for higher recovery, germination vigour and storability of seeds.

Introduction

Homoginising the heterogeneous seed lot is the prime aim of any post harvest seed management techniques. The homogenisation is mainly based on physical characters, as it could be easily adoptable. Balamurugan (1993) in sunflower, Paul *et al.* (1997) in mustard, Singh *et al*. (1998) in groundnut, Rajasekaran (2001) Niger, Balamurugan (2002) in sesame, Chandrashekar (2004) in safflower opined grading of seed is a prime requirement for oil seeds.But Balamurugan (1993) recommend density grading in sunflower for seed quality enhancement, while Rajasekaran (2004) recommended size grading for seed quality upgradation in niger. Sesamum is a crop expressing all possible variation in physical character such as weight, colour and size necessitating the need for processing the seeds before sowing.

Seed polymorphism is one of widely distributed seed character persisted with all crops. Grading of seed either mechanically or manually adopting the seed morphological features such as size, weight and colour are of regular post harvest management techniques for all crops, as the specifications required for grading vary with crop (Agarwal, 1995).

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.

Size grading. The bulk seeds were graded with wire mesh square sieves of size *viz*., BSS 12 x 12, 14 x 14, and 16 x 16. The seeds retained in the above sieves along with seed passed through 16 x 16 (Plate 2) and bulk seeds were analyzed for seed recovery in percentage and for the seed and seedling quality characters.

Seed recovery (%).The weight of seeds retained in each sieve was recorded and seed recovery was calculated in percentage using the following formula

$$\text{Seed recovery (\%)} = \frac{\text{Weight of seeds retained in each sieve}}{\text{Total weight of seeds}} \times 100$$

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)

Results and Discussion

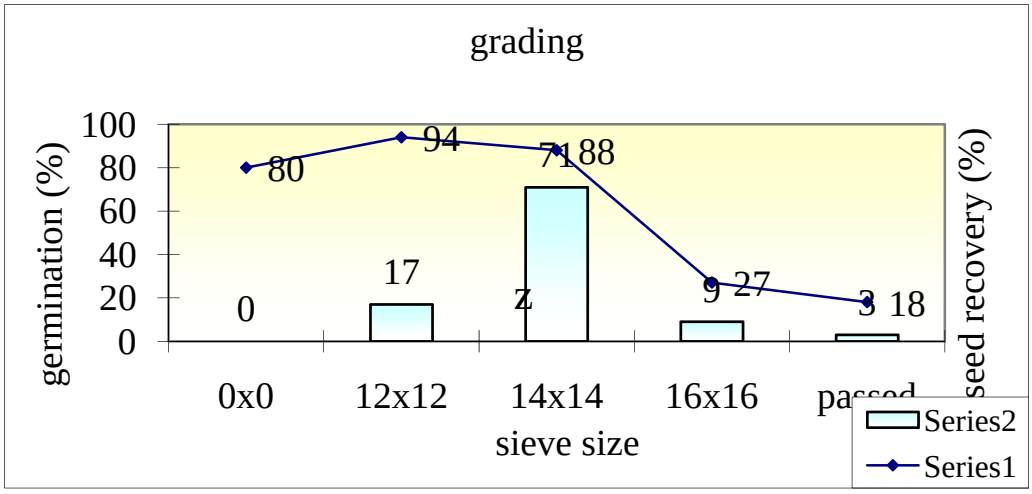
Among the size grades highly significant variations were evident with all the evaluated parameters (Table 1). Seeds retained in each of the sieve size *viz*. 12 x 12, 14 x 14 and 16 x 16 recorded a germination of 98,84 and 27 per cent respectively. The reject recorded 62 percent lower germination than bulk seeds and 70 per cent lower germination than 14 x 14 sieves with higher recovery. Ashby (1936) in his initial capital theory expressed that initial stamina of the seed is expressed during regeneration. But Balamurugan (1993) in sunflower reported

a non significant difference in germination between the larger and medium sized seeds. Among the seedling quality characters evaluated, the root length (9.5 cm) was higher with seeds retained in 12 x 12 sieves and it was followed by 14 x 14 and bulk seed. Similarly shoot length was also higher in seeds of 12 x 12 sieves (8.4cm) and was followed by 14 x 14 sieves (8.1 cm). The drymatter production of seedling recorded by seeds retained in 14 x 14 sieve (58.4 mg) and it was followed by 12 x 12 mm sieve (42.3 mg) which might be due to the greater amount of food reserves and the greater embryo size in larger and medium sized seeds (Sabir-Ahamed *et al*., 2003). The computed vigour index values were higher for seeds retained in 12 x 12 sieve (1682) and it decreased by 11 per cent with the sieve size of 14 x 14. But the decrease was by 17 per cent with seeds of 16 x 16 sieve.

Table.1 Influence of size grading on seed and seedling quality characteristics

Treatments	Seed recovery (%)	100 seed weight (mg)	Germination (%)	Root length (cm)	Shoot length (cm)	Dry matter production 10 seedling^{-1}(mg)	Vigour index
Bulk	-	307	80 (63.43)	7.8	5.8	38.2	1088
BSS 12 x 12 retained	17	358	94 (75.82)	9.5	8.4	42.3	1682
BSS 14 x 14 retained	71	319	88 (69.73)	9.0	8.1	58.4	1504
BSS 16 x 16 retained	9	248	27 (31.95)	7.0	6.0	32.2	351
BSS 16 x 16 passed	3	115	18 (25.10)	5.5	4.0	21.5	171
CD (P=0.05)	**1.235**	**2.012**	**1.819**	**0.600**	**0.191**	**1.102**	**1.699**

Fig.2 Influence of size grading on seed recovery (%), germination (%) and vigour indix



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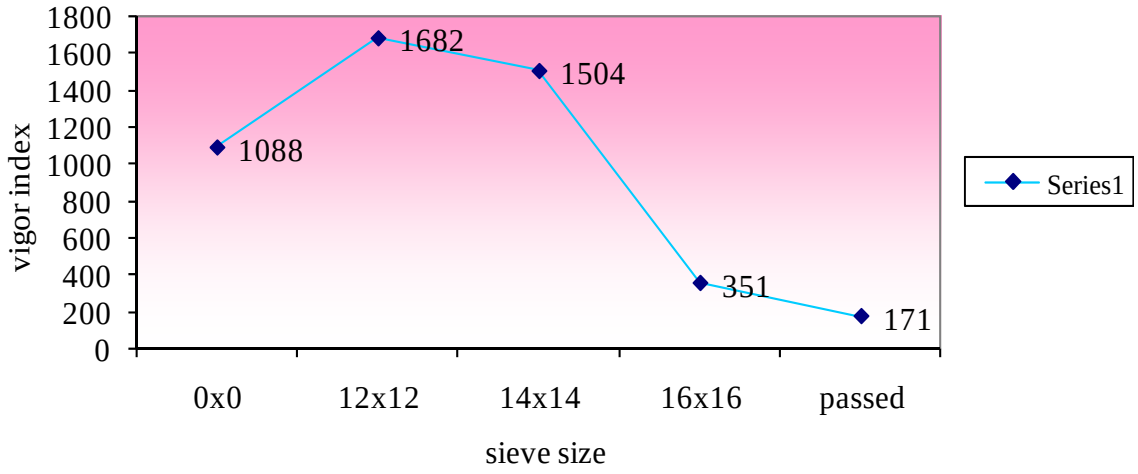
grading



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The vigour index values of bulk seeds were 35 per cent lesser than seeds retained in 12 x 12 sieve. Nachimuthu (1997) in gingelly also reported that seed size ,seed weight and seed quality characters are positively related to each other. All the evaluated vigour parameters exhibited a rhythmic reduction with large,medium, smaller sized seeds and rejects.. Pollock and Roos (1972) reported that larger seeds possessed more vigour than smaller seeds due to the presence of more of food material. Jayashree (1996) in cotton and Rajesekaran (2001) in niger also observed that seedling vigour characteristics were positively correlated with seed size and seed weight. Thus the study highlighted that sesamum CO 1 seed could be graded with BSS 14 x 14 sieve for higher recovery of quality seed.

Grading is one of the important post harvest management techniques that homogenize the seed lot resulting in uniform germination with higher planting value (Srimathi *et al*., 1999). Saeed EL (1966) opined that seed size influenced the phases of germination in terms of early emergence, speed of emergence and seedling growth in addition to seed germination.

The present study on tracing the influence of size grading using BSS hand sieve *viz*., 12 x 12,14 x 14 and 16 x 16 size indicated that the recovery of seeds was the highest (71 per cent) with 14 x 14 sieve, while it was only 17 and 9 per cent with 12 x 12 and 16 x 16 sieves respectively. (Fig.1)

The evaluated seed quality characters of the present study revealed that seed size had positive association with seed weight,where the seeds retained in 12 x 12 sieve (larger size) recorded 68 and 14 per cent higher weight than the reject and bulk seeds, respectively. But it was 11 per cent lesser than the seeds obtained in 14 x 14 sieve obtained with higher recovery. The lesser weight recorded by the larger size seeds could be due to illfilling of seed. Sabir-Ahamed *et al.* (2003) reported that seed

size and seed weight was related positively in sunflower cv. CO 3. However Balamurugan (1993) in sunflower and Srimathi *et al*. (1999) in cotton reported that seed size and seed weight were not positively related to each other.

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