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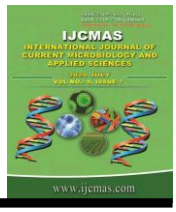

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Standardization of Sieve Size for Grading of Sesame Seeds (*Sesamum indicum L.)* Var. TMV-7

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A B S T R A C T

Sesame (*Sesamum indicum* L.) is a well-known oilseed crop that belongs to Pedaliaceae family. It is cultivated in almost all parts of the country during different seasons of the year. Seed grading is nothing but elimination of injured, diseased, under-sized or otherwise defective seeds to have a homogenous seed lot. The present study was carried out to find out the optimum sieve size for size grading of sesame (*Sesamum indicum* L.*)* var. TMV-7. The seeds were graded using BSS 10×10, BSS12×12 and BSS14×14 wire mesh sieves and evaluated for quality parameters along with control (ungraded). The sesame seeds graded with BSS12×12 wire mesh sieve shows significantly higher seed recovery (77%), germination (94%), 1000 seed weight (2.844g), root length (10.2cm), shoot length (6.3cm), dry matter production (0.0212g/10 seedlings), vigour index-I (1551)and vigour index-II (2.01). Although seeds graded with BSS 10×10 has quality seeds but the seed recovery percentage was very low. Hence, seeds of sesame (*Sesamum indicum* L.*)* var. TMV-7 could be size graded using BSS12×12 sieve for more seed recovery with required seed quality standards as compared to BSS 10×10, BSS14×14 and control (ungraded).

Introduction

Sesame (*Sesamum indicum*L.) is an ancient oilseed crop which is popularly known as "Queen of oilseeds" having other names like gingelly, beniseed, sinsin and till etc., For a successful crop production, the utility of good quality seeds is very important, which increase the yield by 15-20%.Jerlin and Vadivelu (2004) reported that larger seeds having higher seeding survival, growth and establishment. Size of the seed plays a major role in quality seed production. Due to different seed production environment, cultural and management practices, seeds may differ by size, shape, weight, colour and density within a single seed lot.

To separate non seed materials, other foreign seeds and low quality seeds of same species, grading act as an integral part of seed production and enhances the planting value. Grading, the separation of good seed from poor quality seed is one of the basic post-harvest operation of any seed crop (Agrawal, 1996).

Studies pertaining to seed grading based on seed size in relation to seed quality characters are warranted as amount of food reserve in seed is the basic requirement for its future expression as germination, vigour and final establishment at field. In addition, to obtain homogeneous or market appealing seed lot, size grading is inevitable. Therefore, the present study was made in sesame var. TMV-7 to find out optimum sieve size for grading and its effect on quality of seeds.

Materials and Methods

The bulk seeds of sesame var. TMV-7 harvested from the crop raised at Department of Seed Science and Technology, Agricultural College and Research Institute, TNAU, Madurai during 2019-20served as the basic materials for the present study. The pre-cleaned seeds were size graded using British Standard Sieves (BSS) of different sizes.

The treatment includes BSS10×10 R (T_2), BSS12×12 R (T_3), BSS14×14R (T_4) wire mesh sieves, where ungraded seeds served as control(T_1) and seeds passed out from BSS14×14P wire mesh sieve is considered as T_5.The seeds retained in each of the sieves were weighed and expressed as respective percentage of total quantity of seeds processed.Seed recovery percentage is calculated using the following formula.

Seed recovery (%) = Weight of graded seeds in each grade / Total weight of ungraded seeds taken X 100…....[Eqn.1]

The following observations were also made on the above size graded seeds as well as the control (ungraded):

1000 seed weight was determined by recording the mean of eight replications and expressed in gram. Germination percentage (%), root length (cm), shoot length (cm), dry matter production (g/10 seedlings) were observed (ISTA, 2013). The vigour index was calculated using the following formula as per Abdul-Baki and Anderson (1973) and expressed in whole number:

Vigour index-I = Germination (%) x Total seedling length (cm)……...[Eqn.2]

Vigour index-II = Germination (%) x Dry matter production (g/10 seedlings)…..[Eqn.3]

Statistical analysis

The data collected from various experiments were analysed statistically adopting the procedure described by Panse and Sukatme (1985). AGRES software package was used for finding critical differences (CD) values. The critical differences (CD) were calculated at 5 per cent probability level. Wherever necessary, percentage values were transformed to arc sin values before carrying out the statistical analysis.

Results and Discussion

Among various post-harvest management techniques, grading plays an important role in improving the uniformity of the seed lot by separating seeds of same species with low quality and thereby resulting in uniform germination with higher planting value. The present study observed that seed recovery of sesame was significantly influenced by size grades.

The seeds retained by BSS 12×12 R (T_3) sieve (77%) recorded highest seed recovery than those seeds retained by BSS 10×10 R (T_2) (8%) and BSS 14×14R (T_4)(11%) sieves. (Fig. 1)[Eqn. 1].The seeds retained by BSS 10×10 R (T_2) sieve recorded the highest 1000 seed weight (3.216 g) followed by BSS 12×12 R (T_3), which register the larger size of the seed than BSS 14×14 R (T_4)sieve (Fig. 3).

Several studies like that of Srimathi *et al.*, (2003) in lucerne; Menaka and Balamurugan (2008) in amaranthus; Jerlin *et al., (*2010) in jute; Sadeghi *et al., (*2011) in safflower; Ragupathi (2017) in proso millet; Pozhilarasi *et al., (*2018) in amaranthus and Suruthi *et al.*, (2019) in barnyard millet, above all reported a positive association between size and weight of seeds.

The germination capacity increased progressively with increase in seed size. The larger seeds retained by BSS 10×10 R (T_2) sieve size recorded the highest germination (96%) followed by the seeds retained by BSS 12×12 R (T_3) (94%) and BSS 14×14 R (T_4) (66%) whereas the control(ungraded) (T_1) seeds recorded 71% of germination (Fig.1). The higher germination of larger seeds possessed more vigour than small seeds due to presence of more of food material and increased activity of redox-enzymes which might have helped to breakdown complex food into simple soluble sugars. The results are in agreement with findings of Ndor *et al.*, (2012) in pumpkin. The other seed quality parameters like root length (10.8 cm), shoot length (6.6 cm)dry matter production (0.023 g seedlings/10) and vigour index-I (1670) and vigour index-II (2.21) also endorsed the superiority of large sized seeds retained by BSS 10×10 R (T_2) and followed by BSS 12×12 R (T_3) sieves(Fig.2 and 3) whereas ungraded bulk seeds(control)(T_1) recorded shorter rootlength (9.1 cm), shoot length (5.6 cm), dry matter production (0.019 g/10 seedlings), vigour index-I (1044)[Eqn.2] and vigour index-II (1.35) [Eqn.3].

The seeds passed through BSS 14×14 P (T_5) sieve were found to be inferior quality and recorded lower values in all the parameters like seed recovery (4%), 1000 seed weight (1.688g), germination percentage (62%), root length (7.6cm), shoot length (4.6cm), dry matter production (0.0151 g/10 seedlings) and vigour index-I(756) [Eqn.2] and vigour index-II (0.94) [Eqn.3].Due to the greater quantity of storage materials and nutrient reserves available in larger seeds contributed higher energy production. Similar findings were also reported by Farahani *et al.*, (2011) in wheat; Ponmani, (2015) in barnyard millet; Arunkumar *et al., (*2017) in foxtail millet.

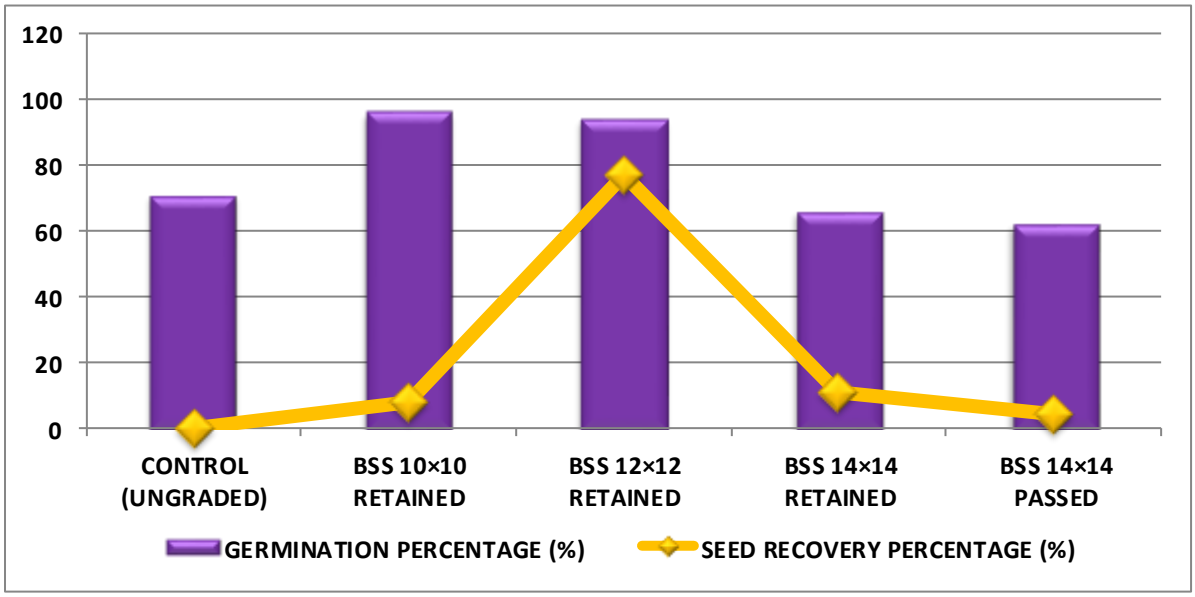

Fig.1 Effect of size grading on seed recovery percentage (%) and germination percentage (%) in sesame var. TMV-7

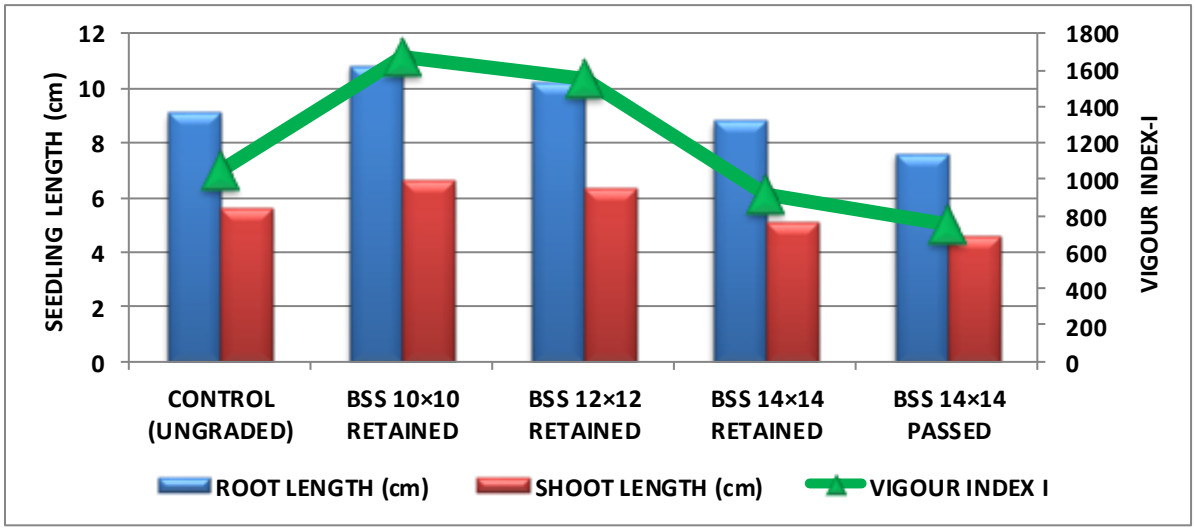

Fig.2 Effect of size grading on root length (cm), shoot length (cm) and vigour index-I in sesame var. TMV-7

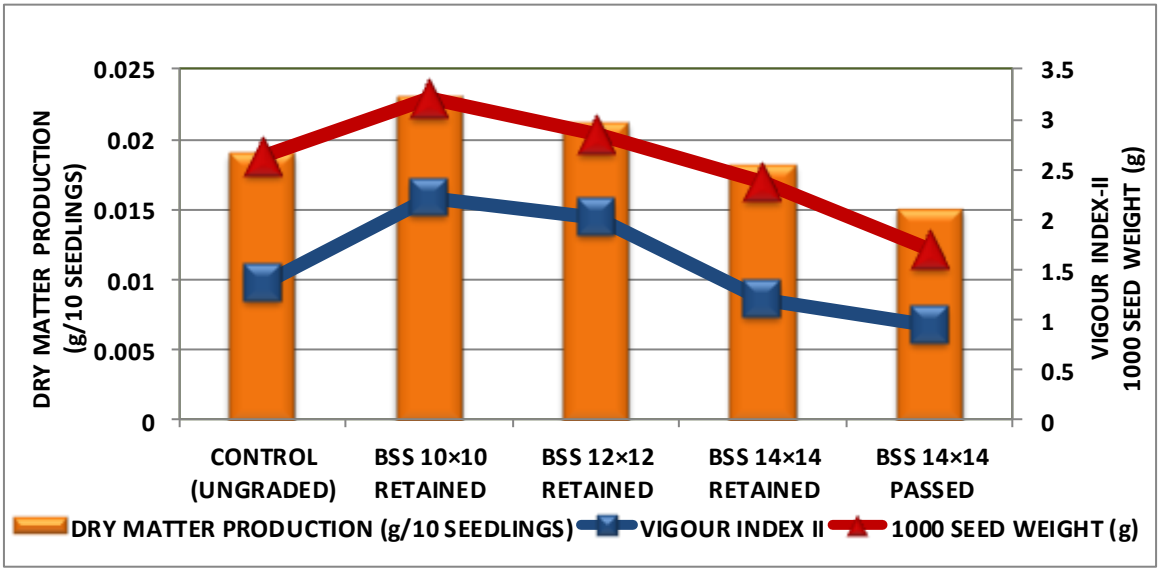

Fig.3 Effect of size grading on dry matter production (g/ 10 seedlings) and vigour index-II and 1000 seed weight (g) in sesame var. TMV-7

It was concluded that, even though sesame seed quality was higher in BSS10×10R (T_2) retained seeds but the seed recovery was very low. The seeds graded with BSS12×12 R (T_3) recorded higher seed recovery (%) with required seed quality parameters such as germination (%), seedling length, dry matter production and vigour index. Therefore, BSS12×12R (T_3) sieve could be recommended for size grading of sesame var. TMV-7 on the basis of both seed recovery (%) and seed quality parameters.

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