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Physiological Quality of Eggplant Seed as Influenced By Extraction Method

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Abstract

An experiment was conducted to evaluate and compare the seed extraction methods on physiological quality of eggplant seed in Seed Technology Laboratory of Bangabandhu Sheikh Mujibur Rahman Agricultural University during 2012-2013 growing season. Full ripen standard size fruits (60 DAA) of eggplant var. BARI begun-5 (round shape) and BARI begun-8 (long shape) were harvested and kept in ambient condition for five days after harvest ripening to become soften and matured fully. Then seeds were extracted from the fruits by using two methods i.e. (i) wet method and (ii) dry method as experimental treatment. The treatment efficiency was evaluated from the following tests: purity, seed weight, germination, co-efficient of germination, seedling length, seedling fresh weight, electrical conductivity and seedling vigour index. The results suggest that wet seed extraction without fermentation is comparatively better then dry method in maintaining physiological quality of eggplant seeds. Dry seed extraction method is labourious as well as difficult to accomplish and may only be used for small- scale seed extraction.

Keywords: *Solanum melongena* L; Seed extraction and quality

Introduction

Eggplant (*Solanum melongena* L) is one of the most popular and economically important vegetable, which can be grown throughout the year in Bangladesh. It is a perennial but grown commercially as an annual crop and extensively cultivated in all parts of Bangladesh [1].

Due to the lack of knowledge and skill on seed extraction method the quality of eggplant seed are not ensured at the grower's level. The search for new technologies or even technological modifications in the seed production system has been constant in seed research, resulting in changes in the various stages of the seed production process and leading to their improvement. Seed technology of any crops comprises several steps like production, harvesting, processing, drying, storing, transportation and finally timely marketing. Every steps of seed technology is very important to ensure the quality of seed. Seed extraction is an important and first step of seed processing for fleshy fruited vegetables like eggplant. Seed extraction from the fruit is accomplished by pulping by hand or machine followed by removal of the inert matter from the seed by mechanical means, washing or by drying and winnowing.

Several seed extraction methods are used to extract seed from eggplant fruits. These are wet method, dry method, natural fermentation method, chemical fermentation method, mechanical extraction method etc. Natural fermentation consists of placing the seeds, together with the placenta and/or pulp of the fruits, in the plastic containers for time periods, which depend on the species [2]. The process has some disadvantages, including the risk of seeds germinating during seed fermentation, seed darkening, spoiling of their commercial appearance and reduction of the germination percentage if the fermentation time is prolonged. Other methods, such as immediate washing of pulp containing seeds through water to remove seed mucilage [3,4]. In dry method, the flesh with the seed cut into thin slices and dried in the sun directly up to seeds are fully separated which is useful for very small scale seed production purposes.

Hydrochloric acid, sodium hydroxide, ammonium hydroxide, sodium carbonate, sulphuric acid, calcium hypochlorite and pectinases can be used during seed extraction [5]. Contrary, according to Franca et al. eggplant seeds do not need to be fermented during extraction [6]. In addition, fermentation with hydrochloric acid reduces the physiological quality of eggplant seed. Couto et al. reported a reduction in germination when cucumber seed were extracted from the fruit with hydrochloric acid [7]. Though chemical fermentation method is the faster to remove seed mucilage but these chemical are hazardous for health and risky in handling at grower's level.

As seed quality of eggplant depends on seed extraction methods and as there is scanty information about seed extraction and processing of fleshy fruited vegetables. Therefore, the present investigation was undertaken to evaluate and compare the effect of wet and dry seed extraction methods on physiological quality of eggplant seed.

Material and Methods

The experiment was conducted at Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur during November 2012 to June 2013. Full ripen fruits (60 DAA) of eggplant were harvested from the experimental field. Standard size fruits (not the biggest one or the smallest) were selected for seed extraction purpose. The selected fruit were kept in ambient condition for five days after harvest ripening to become soften. Then seed were extracted from the fruits by using two methods i.e. (i) wet method and (ii) dry method as experimental treatment.

Wet seed extraction method

In wet seed extraction, the harvested ripen fruits are stored for 5

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days at room temperature to become soften. This allows the seeds to mature fully [8,9]. Then the outer covering is peeled off and the flesh with the seed is cut into thin slices. These are then softened by soaking till the seed are separated from the pulp. After separation, the seeds were dipped into water and washed and clean thoroughly. Those which floats were rejected (Figure 1). The seeds should then be dried in the partial shade to moisture content of 8% or below before storing. And then laboratory test were done within 20 days after seed extraction.

Dry seed extraction method

In dry seed extraction, the ripened fruits are harvested and dried in the sun for 5 days to become soften and shriveled. During drying of yellowish fruits, the skin colour turns to coppery brown. The fruits are then hand beaten or rolled to extract the seed. The outer covering was also peeled off and the flesh with the seed was cut into thin slices. Then the thin slices have been dried in the sun directly up to seeds were fully separated (Figure 1). Then seeds have been clean out through winnowing and dry out moisture content of 8 % or below before storing. And then laboratory test were done within 20 days after seed extraction.

Figure 1: Dry seed extraction method (1, 2, 3 and 4) and wet seed extraction method (5, 6, 7, 8 and 9).

Experimental variables

Experimental variable consisted of two eggplant varieties viz. BARI begun-5 (round shaped) and BARI begun-8 (long shaped) with two seed extraction methods i.e. wet method and dry method as experimental treatment which were used widely in Bangladesh for seed extraction of eggplant. The experiment was laid out in completely randomized design (CRD) with three replications. Then the following parameters were determined for each treatment.

For purity percentage, purity analysis is done through separating pure seed, other crop seed, weed seed and inert matter present in the samples and express in percentage by weight of each of the component part to one decimal place. The percentages recorded based on the sum of the weight of the components. 1000-seed weight, germination percentage, co-efficient of germination, seedling length, seedling dry weight, electrical conductivity and seedling vigour index (germination percentage x seedling dry weight (mg)) were determined according to ISTA [9].

The data collected on different parameters were subjected to analysis of variance (ANOVA). Microsoft EXCEL and CROPSTAT software programs were used wherever appropriate and the mean were compared by LSD value.

Results and Discussion

The effect of seed extraction method on seed quality and seedling growth of eggplant have been presented and discussed character wise through different graphs in this chapter.

Purity percentage

There was a significant variation in purity percentage of eggplant seed due to different seed extraction method (Figure 2A). Significantly higher purity percentage of seed was found in wet seed extraction method whereas; below standard seed purity was found in dry seed extraction method. Both varieties showed the same trend of seed purity percentage by different treatments. The result indicated that purity percentage of seed is increased when seed extracted by wet method. This may be due to attach the mucilage with seed during dry seed extraction but in wet method mucilage were washed out through water.

1000-seeds weight

The 1000-seeds weight was not influenced significantly by seed extraction method. Both varieties showed the same trend of 1000-seeds weight against different seed extraction method (Figure 2B). BARI begun-5 showed higher 1000-seeds weight than BARI begun-8. That means BARI begun-5 produced bolder sized seed than BARI begun-8. Therefore, same amount of seed contained higher number of seeds in BARI begun-8 than BARI begun-5. This may be the genetical character of the variety.

Seed germination

Seed germination percentage was influenced significantly by seed extraction method. Always higher germination was found by wet seed extraction method in both varieties (Figure 2C). The result indicated that wet seed extraction method is better than dry method in favor of seed germination percentage. This result are in agreement with the findings of Savaraj et al. who observed that the traditional extraction (pulp squeezed and washed in water and shade-dried) was the best for

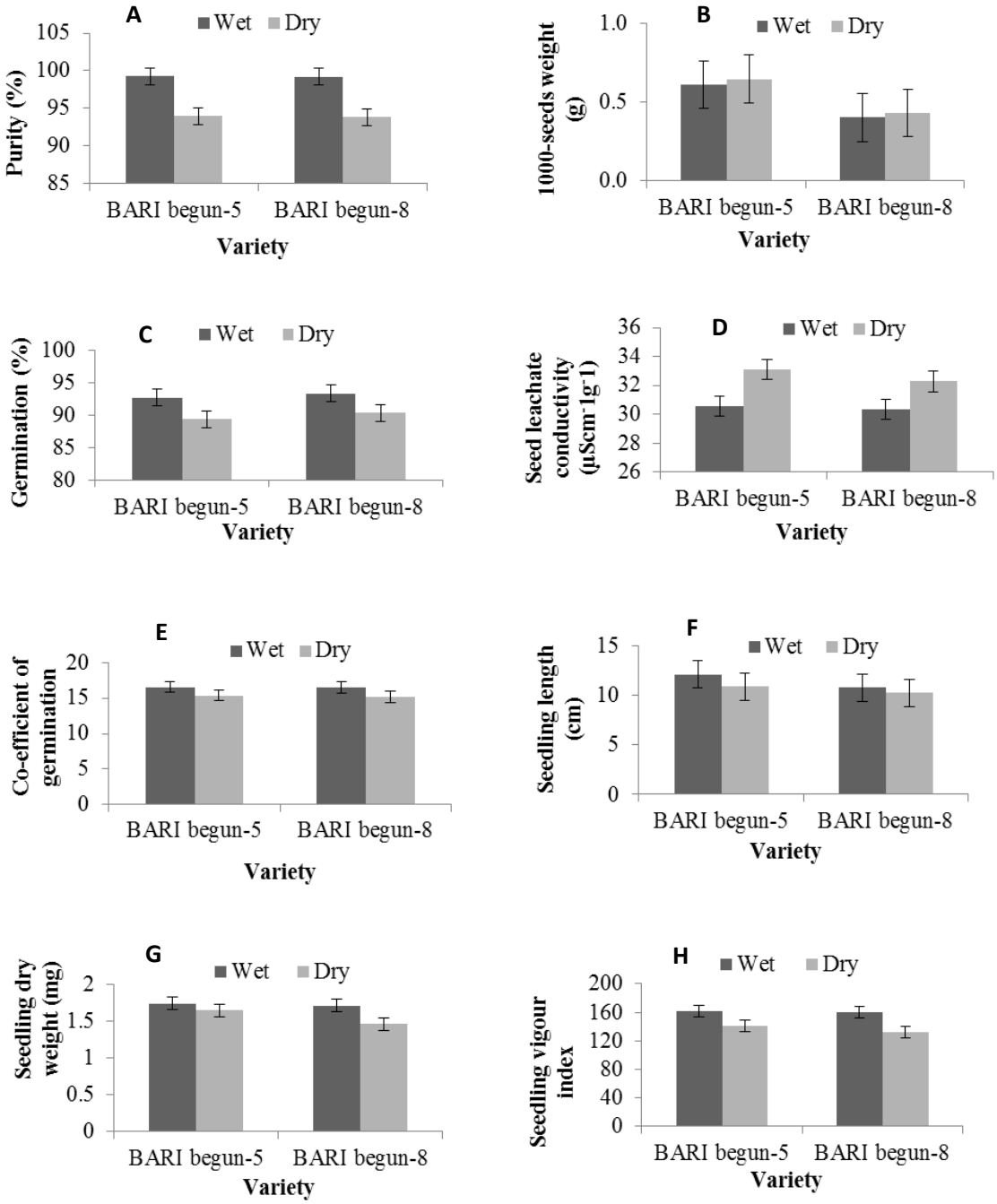

Figure 2: (A) Effect of seed extraction methods on Purity percentage, (B) 1000-seed weight, (C) Germination percentage, (D) Seed leachate conductivity, (E) Co-efficient of germination, (F) Seedling length, (G) Seedling dry weight and (H) Seedling vigour index of eggplant seed.

medium term storage as it was beneficial to germination percentage and seed vigour of eggplant [10]. During dry seed extraction seed mucilage were not remove clearly moreover they dried and attached with seed and may cause to favor for storage fungi finally deteriorate the quality of seed in storage.

Seed leachate conductivity

Seed leachate conductivity was influenced significantly by both seed extraction method within the variety. The electrical conductivity was significantly lower in seeds extracted by wet method than the seeds extracted by dry method in both varieties (Figure 2D). The result indicated that the seeds extracted by wet method were better cell membrane integrity and hence these seeds are more vigourous. During dry seed extraction cell membrane of seeds may be injured and hence these seeds are less vigourous.

Co-efficient of germination

Co-efficient of germination remained unaffected by both seed

extraction method. However, numerically higher co-efficient of germination was found by wet seed extraction method (Figure 2E). The result indicated that seeds extracted by wet method were more vigourous than dry extracted seed as higher the co-efficient value indicates higher seed vigour. Savaraj et al. also reported that the traditional extraction (pulp squeezed and washed in water and shade-dried) was found to be the best for medium term storage as it was beneficial to germination percentage and seed vigour [10].

Seedling length

Seedling length was not influenced significantly by both seed extraction method. However, numerically higher seedling length was found by wet seed extraction method in both varieties (Figure 2F). Higher seedling length favors higher plant establishment in the field.

Seedling dry weight

Seedling dry weight (mg) influenced significantly by seed extraction method in BARI begun-8 but unaffected in BARI begun-5 (Figure 2G). However, numerically higher seedling dry weight was found when wet seed extraction method used in both varieties. The result indicated that wet seed extraction method favored to grow vigourous seedling and hence seedling dry weight was high.

Seedling vigour index

Significant variation was observed in seedling vigour index of eggplant due to different seed extraction method. Seedling vigour index was significantly higher in wet seed extraction method than dry method (Figure 2H). The result indicated that seedling produced from the seed of wet extraction method were more vigourous than dry extracted seeds.

Conclusion and Recommendation

The result of the present study indicated that physiological quality of eggplant seed extracted by without fermenting wet method was maintained better then dry method.

Dry seed extraction method is labourious as well as difficult to accomplish and may not be used for large scale seed extraction.

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