



Seed Germination of *Stevia rebaudiana* Influenced by Various Potting Media

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ARTICLE INFO

Received: 21 Jul. 2013
Revised: 15 Sept. 2013
Accepted: 22 Nov. 2013

Keywords: *Stevia*,
germination, media,
soil, vermiculite
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ABSTRACT

Stevia rebaudiana is an herbaceous plant of family Asteraceae. The plant of *Stevia rebaudiana* commonly known as sweet leaf or sugar leaf. It is widely used as a natural sweetener to diabetics and others on carbohydrate-controlled diet. The experiment was conducted to study the germination of *Stevia* seeds in different media i.e. soil, soil + rice husk, sand and vermiculite. Number of seeds germinated was observed daily starting from fifth to twelfth day of sowing the seeds. The data was analyzed statistically at 5% level of significance. The observations showed that variation among different media, in terms of germination percentage was highly significant, statistically. Highest germination per cent was recorded in soil medium (67.5%) followed by soil + rice husk (57.4%), sand (48.4%) and minimum germination in vermiculite i.e. 41.1%. The data reveals that early germination was noticed in all media except vermiculite. In vermiculite the germination was observed on fifth day, first time. Therefore, it is concluded that soil and combination of soil & rice husk can be relied for better germination of *Stevia* seeds.

INTRODUCTION

Stevia rebaudiana is an herbaceous plant of family Asteraceae. The plant of *Stevia rebaudiana* commonly known as sweet leaf or sugar leaf. It is widely used as a natural sweetener to diabetics and others on carbohydrate-controlled diet. *Stevia* can be grown on relatively poor soil. *Stevia* is often referred to as the “sweetest plant of the world”. *Stevia* leaves are very rich in various chemical constituents such as: Vitamin C, vegetable fat, manganese, proteins, sodium, beta carotene, fibre, niacin, riboflavin, thiamin, chromium, iron, phosphorus, selenium, cobalt, magnesium, potassium, silicon, zinc etc. The documented

properties of *Stevia* are antibacterial, anti fungal, anti-inflammatory, anti-microbial, anti-viral, anti-yeast, cardiogenic, diuretic, hypoglycemic and hence a boon to diabetic people, hypotensive, tonic, and vasodilator (Garcia, *et al.*, 2011; Ozbayer, *et al.*, 2011). Indeed, the leaves contain diterpene glucosides with a sweet taste but which are not metabolised and contain no calories. The biggest part of the sweet glucosides consists of the stevioside molecule.

Stevia can be cultivated through transplants from cuttings or tissue culture raised propagules but these both methods are not cost effective. So, most feasible method for cultivation of *Stevia* is using seeds.

The plant produces seeds in bulk every year but seeds need to be collected very sophisticatedly. The only problem in cultivation of *Stevia* using seed is low germination of seeds and there is always requirement to improve the germination rate by many methods. Sometimes potting media play an important role in enhancing the germination rate of seed and better potting medium can be used for successful establishment of seedling of any plant. The present study was conducted to analyze the effect of various potting media on seed germination of *Stevia rebaudiana*.

MATERIALS AND METHODS

The study was conducted in Botany Department of V.S.P. Govt (PG) College, Kairana (Shamli), UP under natural environmental conditions during the year 2011-12. Following procedures were followed during experimentation:

Seed selection:

Two types of seeds of *Stevia* are available in the market i.e., black and tan seeds. For present study black coloured healthy seeds were selected.

Media preparation:

Four different potting media were taken for the present study viz, soil, sand, vermiculite, and soil + rice husk. The detailed information regarding potting media is given below:

Soil: Soil mixture was prepared from soil, sand and farmyard manure in the ratio of 2:1:1, respectively.

Sand: Simple coarse sand collected from river, was used for study.

Vermiculite: Vermiculite is a micaceous mineral, that expands markedly, when heated. When expanded, vermiculite is very light in weight, 90 to 150 kg per cubic meter. Neutral in reaction with good buffering properties and insoluble in water it is able to absorb large quantities of water, 3 to 4 gallons per cu. ft. Vermiculite has a relatively high cation exchange capacity and thus can hold nutrients in reserve and later release them. It contains enough magnesium and potassium to supply most plants.

Soil + rice husk: In this category of potting medium

mixture of soil and rice husk was used in the ratio of 2:1.

Design of experiment:

Completely randomized design (CRD) was used with four replications. Two trays were taken for each medium and each tray was divided into two blocks. Therefore, four blocks were available for each medium.

Sowing:

In each block a total of 200 seeds were sown in the month of March. The seeds were spread over the medium and then covered with thin layer of the same medium. After sowing, the medium was covered with filter paper for uniformly distribution of water till the germination started.

Observation:

After three days of sowing, germination was observed. The filter papers were then removed and adequate amount of water was supplied. The observation on seed germination was started from fifth day of sowing the seeds when seeds started to germinate in all potting media. The plantlets were then counted daily till the germination rate became constant.

RESULTS AND DISCUSSION

Keeping in view, the objective of the study, germination in *Stevia* seeds was studied. Observation regarding number of seeds germinated was started from fifth day to twelfth day of the seeds sowing, thereafter, no further germination was recorded. The close watch was kept for three more days but no further germination noticed. The data was analysed statistically at 5% level of significance. The results are as follows:

The results of ANOVA reveal that variation among different media in terms of germination per cent was highly significant. The final observation regarding germination per cent shows that maximum germination (67.5%) was recorded in Soil medium followed by the combination of soil and rice husk (57.4%). The minimum germination was recorded in vermiculite (41.1%). The germination in sand (48.4%) was better than vermiculite but poorer than soil and soil + rice husk (Fig. 2).

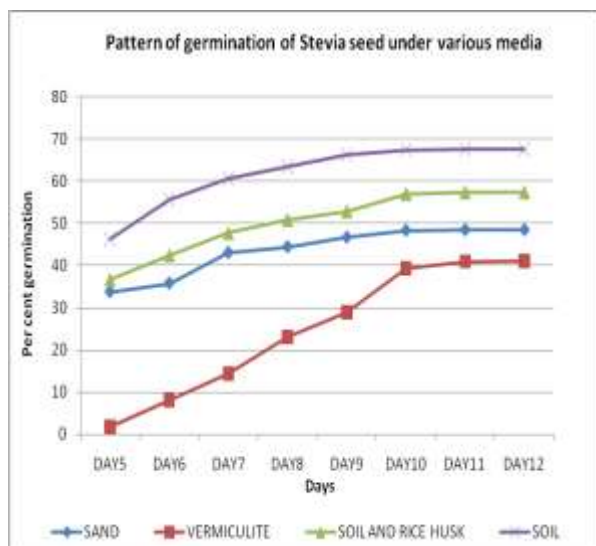


Fig.1. Pattern of per cent germination in *Stevia* seeds under various potting media.

The results indicate that soil is the best medium for germination of *Stevia* seeds. The results may vary for different texture of soil or combinations of soil and other components (Travlos, *et al.* 2007; Zaller, 2007; Celik, 2001). Though, no supportive reference is available in the case of *Stevia* but many workers have reported the superiority of soil over other media in other plant species. Miller (2008) reported that seed germination of *Acacia* in soil was better than in dung. Stewart & Fedewa (1996) observed better germination in field soil than other combinations for *Sporobolus heterolepis*. Idu, *et al.* (2003) observed the higher germination per cent in the sandy and loam + sawdust media than other in the case of *Helianthus annuus*.

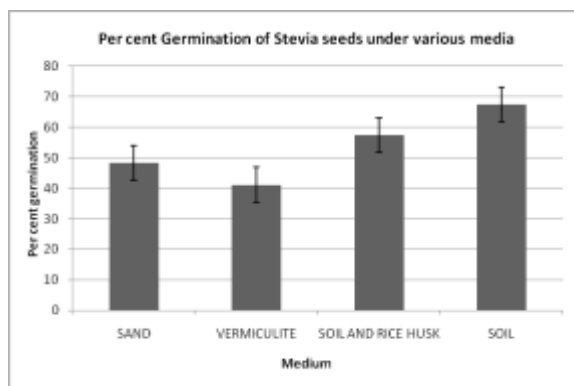


Fig.2. Per cent germination in *Stevia* seeds under various potting media.

Soil and combination of soil & rice husk fall under the same bar statistically indicating they are equal in terms of germination per cent, similarly sand and vermiculite media were also equivalent statistically in terms of germination per cent (Fig. 1 &

2). The combination of soil with other compounds has been reported by many workers. Kannarck & Saiwa (2004) reported that media containing sand or burnt rice husk seems to be the best for germination of *Amoora polystachya*. Tuat (1990) suggested soil:compost ratio is optimum for producing best quality tomato seedlings. Mbakwe (2004) suggested that sowing depulped fruits of *I. wombolu* in 1:1 mixture of top forest soil & saw dust can be relied for obtaining high per cent of germination. Hafeez-ur-Rehman *et al.* (2007) also reported saw dust and silt, soil mixture better than ordinary soil for seed germination and seedling growth in peach.

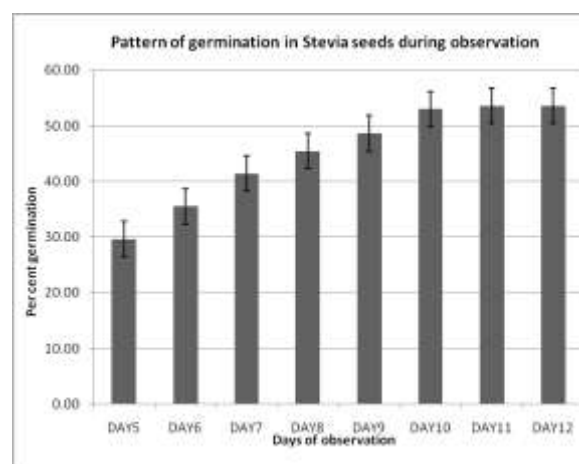


Fig.3. Pattern of germination in *Stevia* seeds during observation

The data reveals that germination was started from third day in all media except vermiculite but in vermiculite the germination started from fifth day. It is clear from the observations that very steady and fast germination was recorded in all media except vermiculite. In the case of vermiculite very poor germination was observed on fifth day of the sowing of seeds but after fifth day the germination per cent increased significantly over previous days in comparison to other media. The late germination in vermiculite was noticed till the final observation of the study. The similar result was reported by Davis *et al.* (2004). He observed that fewer walnuts were germinated in vermiculite than in a soil mixture. Perhaps it may be due to the high water holding capacity of vermiculite. Due to excess water, some seeds may fail to germinate. (Fig. 1).

The results of ANOVA of individual days showed very similar pattern from fifth to tenth day of observation where germination per cent in soil, combination of soil & rice husk and sand was significantly higher than vermiculite. These all three

media found at par statistically in terms of germination per cent and showed their superiority over vermiculite, In last two days the picture was slightly different where soil and combination of soil and rice husk were statistically at par and showed their superiority over sand and vermiculite (Fig.3).

CONCLUSION

The experiment was conducted to study the germination of *Stevia* seeds in different potting media i.e. soil, soil + rice husk, sand and vermiculite: The observations showed that variation among different potting media, in terms of germination percentage was highly significant, statistically. Highest germination per cent was recorded in soil medium (67.5%) followed by soil + rice husk (57.4%), sand (48.4%) and minimum germination in vermiculite (41.1%). The data reveals that early germination was noticed in all media except vermiculite. Therefore, it is concluded that soil and combination of soil & rice husk can be relied for better germination of *Stevia* seeds for mass production of seedlings.

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