

EFFECT OF SOME TREATMENTS ON THE TOLERANCE OF SNAP BEAN PLANTS TO EARLY PLANTING DATES

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ABSTRACT

Nabila Abdel-Basset Ewais: Effect of Some Treatments on the Tolerance of Snap Bean Plants to Early Planting Dates. Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain shams University, 2010.

The field experiment was conducted within the two successive growing season of 2005 and 2006 to study the effect of early sowing dates (15 and 30th of Jan) compared with 15th of Feb., and some treatments i.e., seed soaking in PEG, vit. C, yeast, tap water and foliar spray with yeast and amino acids. The results revealed that snap bean plant vegetative growth, i.e., plant length, fresh weigh, dry matter and leaf area, recorded significantly the highest values at the third date. But numbers of leaves per plant were the highest at second date. With respect of seed soaking and plant spraying treatments, all the previously mentioned parameters of plant vegetative growth recorded the highest values by soaking seeds in tap water, PEG and yeast treatments compared with the control. Also foliar spray by yeast increased plant length, and amino acid treatments significantly increased dry matter percent and leaf area. The best early, total and export able yield were obtained at the third sowing date. Spraying the plants with amino acids with or without seed soaking in PEG were the best treatments for increasing total and exportable yields. In addition, the first and second sowing dates positively increased most of chemical composition (chlorophyll, N, P and protein in leaf). Soaking seeds in PEG and vit. C increased all chemical composition. Also foliar spray treatments had a significant effect on chemical composition in leaves and pods.

Key words:

Snap bean, seed priming, PEG, yeast, ascorbic acid and amino acids.

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1- INTRODUCTION

Green bean (*Phaseolus vulgaris* L.) is one of the popular and important vegetable crops for human nutrition as a source of proteins, fibres, vitamins and minerals. In addition, it is one of the most important vegetable crops for local market and export.

Bean cultivated area in the year 2009 was 70516 Faddan for green pod production yielded 341321 tons with an average of 5 ton/fed. The exported yield amounted to 28348 tons.

Recently, great attention has been focused on early production from green pod yield to export it in early time as much as we can. For that, it is important to study the possibility of early production in the open field with cheap cost by using some treatments, i.e., yeast, amino acids, Vitamin ascorbic acid and PEG (polyethylene glycol) in order to improve seed germination, plant growth and green pod yield.

The yeast contain sugars, proteins, amino acids, some vitamins and source of cytokinin which have stimulatory effects on cell division and enlargement and nucleic acid synthesis and chlorophyll formation.

The amino acids are important for stimulation of cell growth and source of carbon and energy. Also these compounds function in the synthesis of other organic compounds such as protein, vitamins and enzymes.

Ascorbic acid is required in plants in trace amount to maintain normal growth. Functions of it are the reversal of stress effects such as temperature stress.

The PEG compounds have been used to increase germination percentage, reduces germination time and improve uniformity of germination especially under any stress, i.e., low temperature, high temperature, drought and saline condition*.

* Department of Agricultural Statistics, Ministry of Agriculture and Land Reclamation, Egypt 2009.

The aim of this work was, therefore, to find out the response of snap bean plants to some seed soaking and plant spraying treatments at the early sowing dates.

2- REVIEW OF LITERATURE

2-1- Vegetative growth:

2-1-1- Sowing dates:

Singer *et al.* (1996) pointed that the third sowing date (29th of Feb.) showed the highest plant height, number of leaves, fresh and dry weight percentage of snap bean compared with other dates (9th, 19th of Feb.)

Amer, A. (2004) noted that the vegetative growth of snap bean was clearly affected by sowing dates and the highest values of dry weight per plant were recorded by sowing on 10th of Oct. and 7th of Feb. compared to those of November, December and January. **Helal (2006a)** showed that sowing snap bean on 1st of Feb. significantly increased plant height, branches number and dry weight of plant compared to those sown in September and April.

2-1-2- Seed soaking:

Brocklehurst *et al.* (1984) found that the priming of leek (*Alium porrum* L.) seeds in polyethylene glycol (PEG) (6000) significantly improved rate and uniformity of seed germination, earlier seedling emergence and gave higher mean plant weight. **Bradford (1986)** mentioned that the lettuce seed priming in an aerated PEG (6000) solution induced rapidly and uniformly germination under temperature or moisture stress conditions. **Murray (1990)** reported that priming sweet corn seeds using PEG (6000) promoted germination under low temperature (10°C).

Bradford and Somasco (1994) added that lettuce priming in PEG speeded germination by reducing the hydrotim requirement across a range of water potential at both high and low temperatures. **Bruggink and Toorn (1995)** incubated germinated cucumber seeds in a solution of PEG for 7 days at temperature of 8°C. It was found that most seeds survived without serious damage. **Abd El-Hafiz (1999)** reported that the soaking of okra seeds in PEG (8000) for 24 h improved rate and percent

of germination, increased plant length, leaf area and dry weight. **Sanchez *et al.* (1999)** indicated that priming in PEG increased the final germination percentage in tomato and pepper up to 22 and 94%, respectively, in PEG solutions compared with the control. In cucumber seeds, the best germination was recorded just in water as a partial imbibition medium.

Abd El Fattah and Arisha (2000) showed that soaking common bean seeds cv. Bronco in vitamin B₁₂ at a concentration of 2.5 ppm significantly increased stem length, number of leaves and branches per plant as well as the dry weight of all plant organs. **Arisha (2000)** mentioned that soaking pea seeds in vit. B₁ (50,100 and 200 ppm) significantly increased number of leaves, number of branches / plant and dry weight of all plant parts.

Upreti and Murti (2000) studied the effect of seed priming in PEG on French bean (*Phaseolus vulgaris*) cv. Contender. They reported that PEG improved seed germination and seedling growth. **Clark *et al.* (2001)** showed that soaking maize seeds in water overnight before sowing can increase the rate of germination and seedling emergence. **Al-Humaid (2002)** studied the effect of seed immersing of bermudagrass in PEG (6000) solution for 3 or 7 d at 15°C. The result showed that seed priming improved seed germination and seedling growth. **Kaur *et al.* (2002)** studied the effect of priming of chickpea seeds in water for 24 h. It was found that shoot length and shoot biomass were increased compared to non-primed plants.

Khan *et al.* (2005) showed that there was significant increase in seed germination and seedling emergence of mung bean by seed priming with PEG at 300g /L. They added that soaking in water also increased seed germination rate.

El-Seidy (2006) mentioned that sweet corn seed priming in PEG (600) (400g / litre) for 6 h increased plant height, stem diameter, leaf number and fresh weight per plant. **Abd-Allah *et al.* (2007)** studied the

effect of ascorbic acid as seed soaking and foliar spray on common bean, pea and faba bean. They reported that plant height was improved with increasing the level of ascorbic acid (0. 0.1, 0.5 , 1.0. m).

2-1-3- Foliar spray:

El-Beheidi *et al.* (1995) studied the effect of two concentrations of vit. B₁ (0 and 50 ppm) on growth of pea plants. It was found that 50 ppm concentration significantly increased stem length, dry matter of leaves, stem and whole plant at all growth stages. **Fathy and Farid (1996)** reported that using mixture of B₁, B₆ and B₁₂ each of them at 50 mg /l or yeast (5g /l) improved common bean leaf area and dry weight per plant. **Hewedy *et al.* (1996)** indicated that the foliar spray on eggplant with soft bread yeast (2g /l) enhanced vegetative growth, i.e., plant height, leaf area, number of leaves and branches.

El-Ghamriny *et al.* (1999) reported that foliar spraying with vit. B₁ at 25 ppm, vit C at 100 ppm and Baker's yeast at 10g / L were the most effective treatments for enhancing number of leaves and dry weight of plant.

However, **Arisha (2000)** investigated the effect of foliar spray of vit. B₁ (50, 100 and 200 ppm) on pea plant. It was reported that all tested concentrations did not show any significant effect on growth (stem length, number of leaves and branches per plant and dry weight of stems, leaves and total dry weight per plant).

Refaat and Balbaa (2001) studied the effect of single and combined foliar application of vit. B₁ and B₂ on lemongrass plants. They found that such treatments improved the vegetative growth. **Tartoura (2001)** mentioned that the yeast extract plus Ca (No3)₂ spraying on pea plants gave an increases in main stem length, number of leaves, shoot fresh and dry weight per plant.

Attoa *et al.* (2002) noticed that the highest values of plant height, number of branches and leaves as well as fresh and dry weight of *Iberis amara* L. were observed when sprayed by tryptophan amino acid at 75