ANNUAL REPORT OF THE

BEAN IMPROVEMENT COOPERATIVE

BIC

A VOLUNTARY AND INFORMAL ORGANIZATION
TO EFFECT THE EXCHANGE OF INFORMATION AND MATERIALS

VOLUME 61
2018

BENEFITS OF ROCK POWDER COATING OF COMMON BEAN SEEDS

Gilberto A Peripolli Bevilaqua[1], Paulo Eduardo Rocha Eberhardt[2], Regis Araujo Pinheiro[2], Carla Xavier Alves[2], Irajá Ferreira Antunes[1]

[1]Embrapa Clima Temperado, gilberto.bevilaqua@embrapa.br; [2]Faculdade de Agronomia Eliseu Maciel/Universidade Federal de Pelotas

INTRODUCCION

Common bean (*Phaseolus vulgaris* L.), the most cultivated legume for feeding, is one of the most important sources of protein in human's diet. Brazil is one of the main producers and consumers of the grain, which drives a very promising seed market.

Common bean seeds present problems of storability and pest attack, especially in mild climate regions and there are several treatment options to preserve their quality. The definition of methodologies for the conservation of seeds from the ecological point of view is of great importance, since Brazil occupies the second position in Latin America in terms of organically managed area, and about 70% of Brazilian organic production is located in the Southern and Southeastern States (DAROLT, 2002).

The emergency phase is crucial to achieve an adequate stand of seedlings which must present high vigor which will ensure a good crop yield potential. The objective of this work was to analyze and quantify the advantages of the bean seed coating with different rock powder types on the potential storage and vigor of the seedlings.

MATERIAL AND METHODS

Common bean seeds, cv. Expedito, from Embrapa Clima Temperado were used. The seeds were treated with following rocks powder: Basalto from São Mateus do Sul-PR, Natural phosphate from Catalão-GO and Granodiorito, from Pelotas - RS and the combination of Phosphate with Basalt. The adhesive slurry used to fix the powder to the seed was PVA glue, diluted in water, in the proportion of 70 ml of glue to 30 ml of water. The amount of adhesive syrup added to the seed was 3% in all cases. The seeds and gum were placed in a plastic bag which was inflated and hermetically sealed and stirred, then the rock powder was added and again inflated and agitated until complete fixing of the powder to the seeds. The doses of rock powder used in this work was 12% weight gain. The seeds were analyzed by the sand emergency test after 180 days of storage in brown paper packages under favorable conditions of humidity and temperature.

RESULTS AND DISCUSSION

The amount of adhesive solution added directly affects the amount of powder adhered to the seeds and the PVA glue showed good results, but other formulations can be used. Different doses of rock dust were used during the development of the work and the dose of 10% increase in seed mass was the one that presented the best response and was used here in this work.

It was observed a significant effect of the coating on the water content of the seeds and the natural phosphate was the one that provided the lowest water content, significantly higher than the control (Table 1). The reduction was of the order of 1.5 percentual point (pp) and according to Harrington (1972), the reduction of 1pp in water content, in the range of 5 to 14%, doubles the seed storage potential. With the reduction obtained of the water content of the seeds, the storage is guaranteed for a longer period favoring the conservation of the physiological and sanitary quality of the seeds.

Table 1. Seed water content, emergence, emergency speed index (ESI), dry mass of seedlings (DMS) in bean seeds treated with different types of rock dust and harvested at 21 days after sowing.

Rock powder types	Water content (%)	Emergence (%)	ESI	DMS (g)
Natural phosphate	9.0 a	51 a*	11.6 a	5.7 ns
Basalt	10.2ab	47 ab	11.3 ab	5.9
Granodiorite	11.2ab	47 ab	10.3 ab	6.1
Basalt + natural phosfhate	11.0 ab	43 b	9.7 b	5.9
Check	12.3 b	42 b	9.0 b	6.0
CV%	16	14.6	22.4	20

*Values followed by the same letter in the column do not differ by Duncan's test at the 5% level of significance.

Rock powder affected significantly the emergence of seedlings. This fact is due to the amount of time the seeds have been kept under storage, 180 days, which caused loss of vigor due to the environmental conditions of Pelotas, RS, region of mild temperature and high relative humidity. Bevilaqua et al (2015) state that the treatment effect tends to increase throughout storage. The natural phosphate was the one that presented the best results followed by basalt, granodiorite and the mixture of basalt and natural phosphate, but these did not differ from the control. As for the speed of emergence, the beneficial effect of the natural phosphate can again be observed. According to Ching (1973) the P plays an essential role in the germination and vigor of the seeds and its increase seems to positively affect these variables.

For the production of dry mass it is observed that there was no difference between the treatments. The long storage time, short evaluation period and testing season may have affected seed response. The treatment of seeds presented conditions to control the attack of pests, mainly by weevils, that were present in the control.

CONCLUSION

The seed coating with basalt, natural phosphate and granodiorite rock dust present specific effects on seed mass, water content increases seed mass, emergence and emergence velocity but no effect on dry mass production of seedlings.

REFERENCES

BEVILAQUA, G.A.P.; JOB, R.B.; EBERHARDT, P.E.R.; ALVES, C.X.; PINHEIRO, R.A. 2015. Metodologia de recobrimento de sementes de feijão com pó de rocha. Pelotas: Embrapa Clima Temperado, 20 p. (Embrapa Clima Temperado. Boletim de pesquisa e desenvolvimento, 229)

CHING, T. M.; Adenosine triphosphate content and seed vigor. Plant Physiology, Lancaster, v. 51, p. 400-402, 1973.

DAROLT, M.R. Agricultura orgânica: inventando o futuro. Londrina: IAPAR, 2002. 250 p.

HARRINGTON, J.F. Seed storage and longevity. In: KOZLOWSKI, T.T. (Ed.). Seed Biology. New York: Academic Press, 1972. v.3, p.145-245.

VAN STRAATEN, P. Farming with rocks and minerals: challenges and opportunities. Anais Acadêmia Brasileira de Ciências, Rio de Janeiro, v. 78, n. 4, 2006. http://dx.doi.org/ 10.1590/S0001-37652006000400009