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SEED ABORTION IN NATURALLY POLLINATED FLOWERS OF MEXICAN NATIVE PLANTS OF *Phaseolus coccineus* L.

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INTRODUCTION: *Phaseolus coccineus* L. plants require insects or hummingbirds to pollinate their flowers and set pods. The number of pods that can be produced by a plant is set by the number of flowers while the number of seeds is set by the number of ovules within the flowers (Stephenson, 1981). The arrest of the development of the seed after its partial differentiation, -seed abortion-, also determines the number of seeds per plant. The objective of this work is to determine the percentage of seed abortion per plant of two Mexican native varieties of *Phaseolus coccineus* L.

MATERIALS AND METHODS: Two varieties (accessions no. 8446 and 8448) were selected from the Mexican bean collection of the Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP). Seeds harvested in November 2014, were sown in pots on April 5, 2015 and seedlings were transplanted outdoors on April 20, distant 2 meter apart. The plants were of indeterminate growth, climbing type. There were a natural occurrence of bees, bumblebees, and hummingbirds pollinators during the flowering period. The experiment was a complete randomized design, with two treatments (varieties), five replications (one plant per replication) and five sampling dates (Oct. 14, Nov. 4, Nov. 25, Dec. 9, and Dec. 16). At each sampling date, the mature pods per plant were harvested and opened. The following data were registered: a) the number of normal seeds per pod; b) the number of aborted seeds per pod including early abortions detected with the stereoscopic microscope. The sum of (a) and (b) = c, which represented the *potential number of seeds per POD* in each sampling date. It was evident at this point that practically all the pods *in a variety had the same potential number of seeds. Therefore, the potential number of seeds per PLANT* in each sampling date represented by $Y = c*n$, where n represents the number of pods per plant in each sampling date. Following when applicable, the similar procedure for seed abortion: Z = total number of aborted seeds per plant in each sampling date. The *percentage of seed abortion* $(Z/Y)*100$ (total number of aborted seeds per plant in each sampling date/potential number of seeds per plant in each sampling date).

Finally, the *percentage of seed abortion per plant for a variety* is the average of the five values obtained for each one of the sampling dates. The means were compared by the t-student test ($p<0.05$) using the SAS program (SAS, 2012).

RESULTS AND DISCUSSION: Both varieties showed 97 % of pods with 4 potential seeds and 3 % of pods with 5 potential number of seeds, while Rocha and Stephenson for the Scarlet variety found pods with 6 potential number of seeds. Therefore, the representative number of potential number of seeds per pod is characteristic for a variety.

The representative *seed abortion percentage* was different between varieties. In the accession 8446 was 48, and the accession 8448 was 33% in average ($p<0.05$) (Fig. 1). It can be concluded that under natural conditions, these two varieties differ in the abortion percentage.

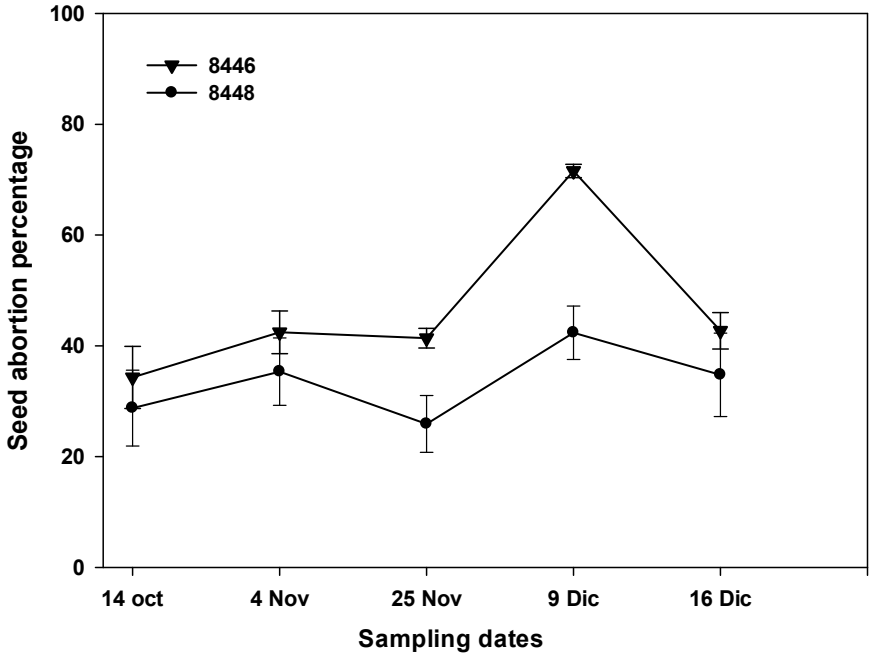

Figure 1. Seed abortion percentage in two native varieties of *Phaseolus coccineus* L.

REFERENCES

Rocha, O.J., and A. G. Stephenson. 1991. Effects of nonrandom seed abortion on progeny Performance in *Phaseolus coccineus* L. Evolution (45) (5): 1198-1208.

Statistical Analysis System (SAS Institute). 2012. SAS version 9.4 for Windows. SAS Institute Inc. Cary, N.C., USA.

Stephenson, A.G. 1981. Flower and fruit abortion: proximate causes and ultimate functions. Ann. Rev. Ecol. Syst. 12:253-79.