Calcium content in pods of diferent snap beans cultivars

Édison Miglioranza[1], Ricardo de Araújo[1], James Nienhuis[2],José Roberto Pinto de Souza [1]

[1] Universidade Estadual de Londrina/CCA/Depto de Agronomia C.P. 6.001
CEP 86.051-990 Londrina/ PR E-mail: emiglior@uel.br [2]. Depart. of Horticulture, University of Wisconsin, Madison, WI.53706.

INTRODUCTION

Calcium is a mineral found in large quantities in the human organism, and the daily requirement in adolescents is 1200 mg/day (National Research Council, 1989). Calcium shortage increases the probability of illnesses, especially those related to the bones. Among the vegetables analyzed by Steves, 1974, the snap bean (*Phaseolus vulgaris* L.) was the third best option calcium source among 39 plants (fruits and vegetables) analyzed. Studies in the USA show that cultivars have different potentialities for pod calcium accumulation (Miglioranza et al. 1997; Quintana et al. 1999b) This experiment was carried out to study the variation of the calcium content of different snap bean plant cultivars found on the Brazilian market for breeding purposes. The idea is to release bean plant cultivars with greater calcium concentrations in the near future.

MATERIAL AND METHODS

The experiment was planted in a Oxisol soil, clay texture, from September to November 1998 in Londrina PR, under a Cfa climate according to the Köppen classification. A randomized complete block design with four replications and seven commercial snap bean plant cultivars with determined growth habit were used, Xera, Florence, F-15, Anseme, UEL-1, 274 and Nerina. Each plot was four rows, four meter long, spaced 40 cm apart with 10 plants per linear meter. All plots were fertilized with 1000 $kg.ha^{-1}$ as NPK (04-14-08) at sowing and 200 $kg.ha^{-1}$ as ammonia sulfate 15 days after emergence (DAE). Plots were irrigated biweekly as necessary to bring total rainfall + irrigation amounts to 25mm.$week^{-1}$. The two central rows trimmed 0.50m at each end were used for data collection. The # 4 pods were collected from each plant (8.3 to 9.4 mm diameter) following the Mullins et al. (1988) classification. The pods collected from each cultivar were placed in an oven with forced air circulation at 50-55°C until they reached a constant weight. After drying, the material was milled in a rotary mill, and later sieved through a 1mm mesh. Three 0.400g samples were weighed from each experimental plot and then digested in nitrogen perchloride until discoloring of the sample. The samples were diluted with de-ionized distilled water to a volume of 400ml. A homogeneous quantity was removed from this sample and the calcium content was quantified using an atomic absorption spectrophotometer

RESULTS AND DISCUSSION

The calcium content in fruit from seven snap bean cultivars studied ranged from 4.37 to 6.03 mg calcium/g MS (Table 1). Miglioranza et al. (1997) observed calcium concentration ranging from 4.1 to 5.7 mg/g MS in pods of 12 snap bean cultivars. Quintana et al. (1999b) studied 64 snap bean genotypes and found a variation of 3.82 to 6.80 mg calcium/g MS in snap bean pods. Quintana et al. (1999a) found calcium variation between 3.8 and 5.5 mg calcium/g MS. These results are in line with those obtained by Quintana et al. (1996b) and Miglioranza et al. (1997) who obtained means of 5.3 and 5.0 mg calcium/g MS, respectively. The comparison of these results seems to show that calcium accumulation in snap bean pods is similar as long as the soil contains enough of the nutrient, even considering the differences between years and soil types. There were significant differences among the cultivars (Duncan test at $P \leq 0.05$) for pod calcium concentration, the 'Xera' had a significantly higher pod calcium concentration than the 'Florence', which in turn was significantly superior to the F-15, 'Anseme', 'UEL-1' and '274' and

'Nerina'. The Nerina cultivar again showed the lowest pod calcium concentration among all the tested cultivars. This indicates that the differences in cultivar pod calcium concentration is genetically controlled (Quintana et al. 1996b), confirming the hypothesis that some cultivars to accumulate calcium more efficiently than others (Quintana et al., 1996a).

The mechanisms that lead to differences in pod calcium concentration among the snap bean cultivars are still not completely clear. It is presently known, however, that such differences are associated with genetic differences among the genotypes and that other factors, besides the calcium supply in the soil solution, influence pod calcium accumulation.

Table 1. Average pod calcium concentration in snap bean cultivars grown at Londrina, PR, in 1998.

Cultivar	Calcium concentration ($mg.g^{-1}$)
Xera	6,03 a
Florence	5,42 b
F-15	4,78 c
Anseme	4,74 c
UEL-1	4,73 c
274	4,72 c
Nerina	4,37 d
Mean	4,97
C.V.	8,29

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