

**STUDIES ON THE MINERAL NUTRITION AND FERTILIZATION OF THE
PASSION FRUIT PLANT (*Passiflora edulis* f. *flavicarpa*). II – PLACEMENT
OF FERTILIZER PHOSPHORUS***

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SUMMARY

- 1 – Tagged superphosphate was applied to 2.5 year old passion fruit plants from a commercial plantation established in a sandy loam.
- 2 – 100 grams of the fertilizer were distributed in the following ways: in a circular furrow 20 cm deep around the plant 40 cm from the stems; in a circular strip 10 cm wide, 40 cm from the stems; in six holes around the plants, 40 cm from the stems 20 cm deep, 2.5 cm in diameter.
- 3 – 10 grams of the fertilizer in 1 l of water were sprayed to the leaves.
- 4 – Three weeks after the treatments were made leaf samples were taken for analysis.
- 5 – Determinations of specific activities both in the leaves and in the fertilizer used have shown that P in the plant was derived from the superphosphate in the following relative proportions (by making the first treatment equal to 100): circular furrow = 100; circular strip = 120; holes = 30; foliar spray = 230.

INTRODUCTION

Average yields of the passion fruit plant in Brazil 4 t/ha, are nearly ten fold lower than, productions obtained in other parts of the world such as Hawaii and Fiji.

Due to the possibility that lack of fertilizers could be one limiting factors a series of experiments were designed to gain information on nutritional requirements of this crop and on its manuring.

The amounts of macro and micronutrients exported by the passion fruit were determined by PAULA et al. (1974). On the other hand, HAAG et al. (1974) studied the uptake of macro and of some micronutrients during one year of the life cycle of the plant.

Other studies dealing with the response to fertilizers and with the effects of mineral deficiencies on growth and composition of the passion fruit plant are under way.

* Received for publication in 19/11/1975. Com ajuda do CNPq, CNEN e BNDE. Apresentado no V Congr. Latinoam. de Ciência do Solo (Medellin, Colômbia, set. de 1975).

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Having in mind another experiment conducted by MALAVOLTA et al. (1959) on the placement of fertilizer phosphorus in coffee plantations, a similar one was carried out.

MATERIAL AND METHODS

Tagged superphosphate supplied by the Tennessee Valley Authority was applied to 2.5 year old passion fruit plants from a commercial plantation established in a sandy loam.

The treatments with two replicates were the following:

- 1 – circular furrow 20 cm deep around the plant and 40 cm from the stem;
- 2 – circular strip 10 cm wide, 40 cm from the stem;
- 3 – six holes around the plant, 2.5 cm in diameter, 20 cm deep, 40 cm from the stem;
- 4 – leaf spray.

The specific activity of the tagged superphosphate was 4,007,500 counts/minute per gram of P.

One hundred grams of the fertilizer was supplied in treatments (1) thru (3). Ten grams of the tagged superphosphate were dissolved in one liter of water and sprayed to the leaves using a commercial sprayer.

Three weeks after the treatments leaves were taken for analysis. After drying at 70–80°C with forced ventilation, the material was ground. A 10 g sample was dry ashed at 500°C, dissolved in 1 + 9 HCl, and filtered. A 2 ml aliquot was taken for counting after being dried in a glass planchet, using a thin window Geiger-Muller counter. In another aliquot P was determined by the molybdovanadate method.

RESULTS AND DISCUSSION

Table 1 gives the results, obtained in the experiment, average of two replicates which agreed within 5 per cent deviation.

TABLE 1 – Contribution of fertilizer P to total phosphorus in the leaves.

Treatment	c.p.m./ g. P	% P in leaves from fertilizer	Relative efficiency
1. Circular furrow	36,000	1.0	100
2. Circular strip	46,000	1.2	120
3. Holes	14,000	0.3	30
4. Spray	95,333	2.3	230

The data show that within soil treatments, supplying fertilizer P as a surface application is the more efficient type of placement. The presence of an active root system in the upper layers of the soil thus some downward movement and diffusion would explain the results obtained (BARBER & OLSON, 1968, pp. 163-188) which show very good agreement with previous work on coffee (MALAVOLTA et al., 1959). The limited placement in holes, a time consuming and costly operation used by some growers, does not seem justified.

Spraying the fertilizer to the leaves obviates soil fixation of the phosphate ion and provides a very large area for absorption. Furthermore, since the amount of P applied to the leaves was one tenth of the quantity supplied to the root system, under the experimental conditions foliar feeding was actually 23 fold more efficient than soil application, a value which agrees with data provided by WITTWER et al. (1963).

RESUMO

A localização do superfosfato (marcado com P^{32}) no maracujá em produção foi estudada em condições de plantação comercial. Verificou-se que as aplicações em sulcos circulares ou faixas superficiais ao redor da planta tem eficiência equivalente sendo esses métodos três vezes superiores à localização do adubo em furos no solo. A pulverização foliar, por sua vez, mostrou-se 20 vezes mais eficiente que a aplicação no solo de acordo com os dois primeiros métodos.

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