Production of Yacon Plantlet (*Polymnia sonchifolia* Poep. et Endl.) in Different Organic Fertilization

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Abstract
The work was carried out in nursery of the Agronomical Science College (ASC) UNESP-Botucatu, in period from September 21st to October 31st 2000. The propagation material (rhizophores) was obtained from plants, which were cultivated in the area of ASC. The rhizophores were selected according to their vigor and size. Healthy rhizophores were chosen between 15 and 25 g, which were treated with benomil (0.6 %, 10 minutes). As a basic commercial substratum Solomix® was used with mixing cattle manure and chicken manure in the following proportions: T1- pure substratum; T2 - substratum + cattle manure (1:1), T3- substratum + cattle manure (2:1); T4- substratum + chicken manure (4:1). The yacon rhizophores presented good shoots in all substrata with exception of T4. For all parameters no significant difference between the pure commercial substratum and its mixture with cattle manure were observed; however, the addition the chicken manure in the studied proportions revealed harmful effect on the survival and development of the plantlets. The results indicated, that the viability of smaller size rhizophores was higher as the size conventionally used in Brazil (60 to 80 g).

INTRODUCTION
The yacon (*Polymnia sonchifolia* Poep. et Endl.) is a species introduced in Brazil, recently. It is a new vegetable that presents high contents of sugars with beneficial effects to the human health (diabetes, cholesterol, etc.). The root accumulates fruit-oligosaccharides, with contents of 60 to 70% of the dry matter (Quijano et al., 2000).

Yacon, yakon or yakón is a word of quechua origins (Bonuccelli, 1989). The species is native in Andean valley of Colombia, Ecuador, Peru, Bolivia and northwest of Argentina, at 2000 to 3000 meters above the sea level (Vavilov, 1992, Vilhena et al., 2000). In spite of the original distribution area the yacon plant adapts to a wide range of climates and can be cultivated all around the year (Bonuccelli, 1989).

The yacon root because of its high water content (varying from 69 to 83%) and sweetening value can be consumed in the form of refreshments (Robles, 2000). Furthermore it can be used as a raw in the food industry, as medicinal agent in curing, and producing dietary fibers and gums (Robles, 2000). It can be utilized to produce ethyl alcohol as well (Vilhena et al., 2000). The dehydrated leaves are used to prepare medicinal tea (Robles, 2000).

The plant is perennial herbaceous/shrubby, that reach up to 2,5 m (Vilhena, 1997) or 3,0 m (Grau and Rea, 1997) of height. The stem is cylindrical, hairy; the leaves are opposite, arrow like, with irregular margins and winged petioles; the inflorescence is located in the extremity of the branches. According to Vilhena (1997) and Vilhena et al. (2000) the underground system is consist of three parts: rhizophores with buds to produce new shoots; rootses; and succulent tuberoses parts which are rich in frutans, weighing up to 2 kg.

The yacon is cultivated in several countries under different geographical and
ecological conditions, producing up to 100 t/ha of tuberose rootse (Grau and Rea, 1997). In Brazil Japanese immigrants introduced the species in 1989 and it was cultivated in large scale in the municipal district of Capão Bonito, in São Paulo state. The plant is cultivated in open field using either 1,0 x 0,20 m (Robles, 2000) or 1,0 x 0,90 m spacing (Vilhena, 2000).

Because of the lack of knowledge about the cultivation of the plant our idea was to clear up how to get yacon plantlets in nursery, with application of different organic fertilization substrata.

**MATERIALS AND METHODS**

The work was conducted in the nursery (50% of shade) of the Agronomical Science College (ASC) of UNESP - Botucatu, Experimental Campus Lageado, in period from September 21st to October 31st 2000.

The propagation material (rizophores) was obtained from plants grown in the research field of ASC. The rizophores was washed and separated with knife and selected to get vigorous and uniform size of the material. The weight of the rizophores ranged between 15 and 25 g. The plant material were treated with benlate (0,6%/10 minutes).

As the commercial substratum Soil-mix® was used. The commercial substratum was completed by manure treatments, which were as follows:

- **T1** - pure substratum
- **T2** - Soil-mix® + cattle manure (1:1)
- **T3** - Soil-mix® + cattle manure (2:1)
- **T4** - Soil-mix® + aviary manure (4:1)

The substrata were placed in white color pots of plastic of 500 ml, which were perforated at the bottom. A rizophore was planted in each pots using 2 cm depth. The pots were irrigated regularly.

The experiment was randomized with 4 replications.

After 40 days of plantation height of plants (cm), sprouting number, number of leaves of the main sprout, fresh and dry matter, fresh and dry biomass of the aerial part and root (g) were measured. The data were evaluated statistically using the SANEST program (variance analysis, Tukey test).

**RESULTS AND DISCUSSION**

The yacon plantlets, in the absence of specific recommendations were taken off at 40 days after the plantation. The individuals had 7 leaves in that stage, which could be the ideal for planting out.

The yacon rizophores presented good sprouts in all the studied substrata, with exception of T4 (4:1) treatment. In that mixture some of the plants died and those which survived the condition presented small and less vigorous sprouts. In Table 1 the main effect of different substrata on the growth of yacon plantlets are presented.

It is indicated by our results that the viability of rizophores of smaller size is rather good. It does mean that rizophores with weight between 60 and 80 g planted in Brazil commercially (Robles, 2000, Vilhena et al. 2000) might be heavier as required.

However, because of the development of algae the use of disposable plastic pots doesn't seem to be an appropriate method. The application of recipients of dark color, such as black plastic bags and others could be much more appropriate.

**Literature Cited**


Tables

Table 1. Characteristics of yacon plantlets (Polymnia sonchifolia) produced in different substrata. Botucatu - SP, 2000.

<table>
<thead>
<tr>
<th>Substrata</th>
<th>Height (cm)*</th>
<th>Number of leaves*</th>
<th>Number of sprouts*</th>
<th>Fresh matter* (g)</th>
<th>Dry matter* (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aerial part</td>
<td>Root</td>
<td>Aerial part</td>
<td>Root</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>4,63 a</td>
<td>6,24 a</td>
<td>0,94 ab</td>
<td>7,83 a</td>
<td>5,94 a</td>
</tr>
<tr>
<td></td>
<td>5,36 a</td>
<td>7,44 a</td>
<td>1,76 a</td>
<td>7,43 a</td>
<td>7,95 a</td>
</tr>
<tr>
<td></td>
<td>5,64 a</td>
<td>7,75 a</td>
<td>1,53 ab</td>
<td>8,11 a</td>
<td>7,99 a</td>
</tr>
<tr>
<td>4:1</td>
<td>0,25 b</td>
<td>0,72 b</td>
<td>0,20 b</td>
<td>0,25 b</td>
<td>0,05 b</td>
</tr>
</tbody>
</table>

CV (%) 0,50 0,45 0,25 1,04 0,47 0,07 0,02

* Data followed by the same letter, in the column, doesn't differ to each other at 5% of probability for the Tukey test.