

Potentials Insect Pests of Yacon *Smallanthus Sonchifolius* (Poepig & Endlicher) H. Robinson in Brazil

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Abstract— The recent exploration of yacon demands scientific information for improving the crop production technology. A important demand is about Plant health. In this sense, the aim of this study was know insects that promote injuries in yacon crops. The study was developed in Brazil. The planting on a field site began in May 2014. Sampling for injuries and insect display was performed weekly for a period of six months which corresponds to the interval between the emergence of the crop to harvest. Using traversal switchback, detailed surveys were conducted in the shoot 5% of plants aimed at locating injuries and their cause insects. The insects were collected, packed in appropriate enclosures, cataloged and sent to the Entomology Section of Universidade Federal do Espírito Santo for identification standard procedures. The species *Myzus persicae* (green peach aphid) and *Macrosiphum euphorbiae* (Potato aphid), *Edessa mediatubunda* (known the black wings stinkbug in Brazil) and *Dysmicoccus brevipes*, commonly called the pineapple mealybug, were recorded causing injuries in yacon during the cultivation.

Keywords— Hemiptera, Plant health, *Polymnia eduli*, *Polymnia sonchifolia*.

I. INTRODUCTION

The yacon is a Andean tuberous root, that is been consumed in various parts of the world such as North America, Asia and Europe (Maldonado et al., 2008). Economic interest on yacon (*Smallanthus sonchifolius*) has growing due to its nutraceutical properties as reduction of body weight, insulin index modulator, intestinal regulator, improving LDL level (Genta et al., 2010; Tostes et al., 2014) and inhibition of carcinogenic processes (Moura et al., 2012).

Because this is a relatively recente commercial exploitation plant, yacon has no detailed growing system. Regarding to pest attack, for example, very little information can be found. In small yacon-growing areas in Peru, Seminário et al. (2003) observed some insects which feed themselves by eating the aboveground part, including leaves, sprouts and flowers: *Liriomyza* sp. (Diptera: Agromyzidae); *Diabrotica undecimpunctata* and *D. speciosa* (Coleoptera: Chrysomelidae); *Agrotis ipsilon* and *Copitarsia turbata* (Lepidoptera: Noctuidae); *Schistocerca* sp (Orthoptera: Acrididae), and other two insects of Acrididae and Trydactyidae families. The authors also

observed slug attack (*Agriolimax* sp.: Limacidae). Attacking the underground parts, *Golofa aegeon* (Coleoptera: Scarabaeidae) and *Passalus* sp. (Coleoptera: Passalidae) were observed. The sucking insects like green leafhopper (*Empoasca* sp.), showed lower occurrence (Hemiptera: Cicadellidae), and aphids, *Aphis* sp. And *Myzus persicae* (Hemiptera: Aphididae).

In Brazil, the only report was made by Silva et al. (2015) found three species from the Coleoptera order: *Lagria villosa* (Coleoptera: Lagriidae); *Ceratomyza arcuata* and *Diabrotica speciosa* (Coleoptera: Chrysomelidae) and two species from the Lepidoptera order: *Spodoptera eridania* (Lepidoptera: Noctuidae) and *Chlosyne lacinia saundersii* (Lepidoptera: Nymphalidae) were observed causing damage to the yacon crop. The caterpillar *C. lacinia saundersii*, known as sunflower caterpillar, was the most important species, being observed throughout the yacon cycle.

However, number of insects species increases naturally when crop plants are introduced in a new area (Gullan and Craston, 2008). Thus, the aim of this study was to assess insect and their damage on yacon in order to predict future

scenarios of plant health challenges and to adapt sustainable tactics and control strategies in the future.

II. MATERIALS AND METHODS

This work was carried out in an experimental field of Universidade Federal do Espírito Santo, Brazil. After soil chemical analysis, the authors concluded that no correction would be needed; however, planting fertilization using cattle manure equivalent to 50 kg of nitrogen per hectare was performed.

The experimental field was composed of 1000 plants spacing of 1.0 m between lines and 0.5 m between plants, in an area of 500 m². Cultivation began in April 2014 and emergence of the shoots was 30 days after planting (DAP) of the rhizophores. Plants reached the maximum height of 90 cm after five months (150 DAP) and the harvest was carried out in November (180 DAP). The authors highlight that organic management was adopted, so no insecticides or fungicides were applied during cultivation.

Sampling for injuries and insect display was performed weekly for a period of six months which corresponds to the interval between the emergence of the crop to harvest. Using traversal switchback, detailed surveys were conducted in the shoot 5% of plants aimed at locating injuries and their cause insects. The insects were collected, packed in appropriate enclosures, cataloged and sent to the Entomology Section of Universidade Federal do Espírito Santo for identification standard procedures. At harvest the roots of all plants were also inspected. No damage was found in roots, which were observed at harvest time.

III. RESULTS AND DISCUSSION

Only in the aboveground part, the authors observed aboveground feeding insects; neither presence of insects underground nor symptoms of root attack were detected. *Myzus persicae*, *Macrosiphum euphorbiae* (Hemiptera: Aphididae), *Edessa mediatubunda* (F.) (Hemiptera: Pentatomidae) and *Dysmicoccus brevipes* (Hemiptera: Pseudococcidae) were found in yacon plantation. These species occurred from 120 days until the end of the crop cycle.

M. persicae and *M. euphorbiae* were found underside of leaves in the middle third of the plants, they were grouped near the ribs of leaves. The feeding of this insects cause leaf chlorosis, which relates to the reduction in photosynthetic rate. On the other hand, *M. persicae* is reported as secondary insect-pest for yacon in crops in Peru (Seminario et al., 2003), which is can be due to secondary compounds in this plant that can affects this aphid, what

issuggested by mortality of this aphid by extracts plant (Yun et al., 2012).

Edessa mediatubunda was collected close to apical meristem of plants causing small necrotic lesions. These feeding points decreased the length of internodes of the plant. However, *D. brevipes* was the most important insect due to acute depletion of plants at full growth. Their presence was around the stem, leaf axils and petiole, causing reduction of leaf area, leaf atrophy and chlorosis. *D. brevipes* is an insect pest causing huge damage to pineapple around world, mainly because it is closely related to pineapple wilt and they can survive in over 30 different host plants (Lacerda et al., 2009). It should stress that the area of yacon cultivation was close to a 0.5 hectares of pineapple plantation which may have favored dispersion of insets to yacon.

Is worth mentioning this plant is traditionally grown in polycultures as additional option of income for producers. Changes in the production system, such as monocultures, may increase likelihood that other insects adapt in this crop plant.

IV. CONCLUSION

During the cultivation of yacon, the species *Myzus persicae* were recorded (green peach aphid) and *Macrosiphum euphorbiae* (Potato aphid), *Edessa mediatubunda* (known the black wings stinkbug in Brazil) and *Dysmicoccus brevipes*, commonly called the pineapple mealybug, were recorded causing injuries in yacon

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