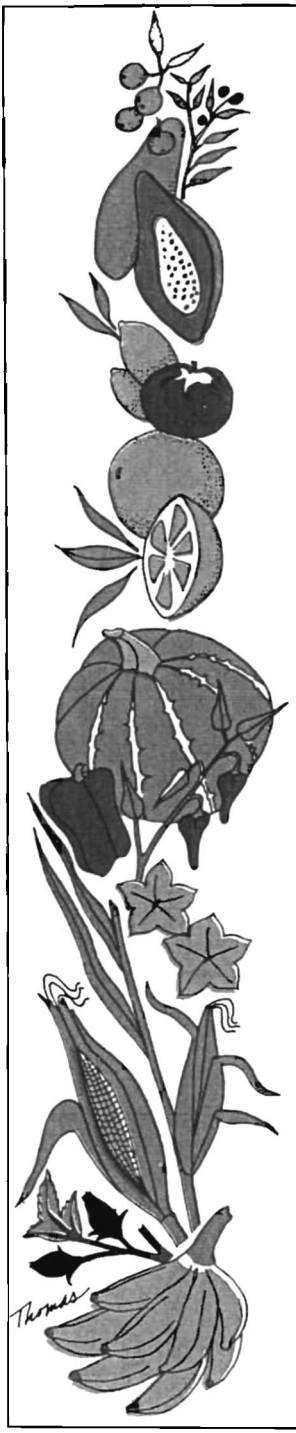

CARIBBEAN FOOD CROPS SOCIETY

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THIRTIETH ANNUAL MEETING 1994

ST. THOMAS, U.S.V.I.

Vol. XXX

BIOLOGICAL NITROGEN FIXATION AFTER STEM CUTTING IN TUBEROUS *PACHYRHIZUS EROSUS*

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INTRODUCTION

Yam bean (*Pachyrhizus erosus*) a tuber-forming legume, is particularly suitable for evaluating the potential availability of the plant reserve carbohydrates for nitrogen fixation (Vaillant et al., 1990, 1993). The tuber of this species contains soluble sugars and starch which account, respectively, for 32 and 15% of dry weight. Furthermore, tuberous and non-tuberous plants may be available in inductive or noninductive environment (Robin et al., 1990; Sorensen et al., 1993).

A stem cutting experiment was conducted with tuberous *Pachyrhizus erosus* in order to evaluate its potential for maintaining N fixation after aphotosynthate stress. This paper report the effects of such a treatment on the Acetylene Reduction Assay (ARA) of nodules and on the concentration of N fixation products in underground organs.

MATERIALS AND METHODS

Pachyrhizus erosus seeds were sown in December 1992 at INRA Guadeloupe. After 10 weeks of growth, detopping was carried out by cutting the stem at 2 cm above the tuber. The underground part was maintained in soil and watered every three days to prevent sickness. The rate of N fixation was estimated by the ARA and expressed as umol ethylene h^{-1} g^{-1} fresh weight of nodules. Amino compounds and ureides were extracted in 80%(v/v) ethanol. The ethanol soluble extracts were vacuum dried and redissolved in water. Amino compounds were assayed by the ninhydrin method. Ureides were assayed according to Trijbel and Vogels (1966). Total nitrogen was assayed by the Kjeldahl procedure.

RESULTS

Detopping resulted in a 70% decrease of N fixation, which then remained stable for 17 days. Total nitrogen in underground parts increased by 52% after 14 days. In nodules, ureides and amino compounds increased until 2 days and then dropped to about the same level as that of the control. Both ureides and amino compounds remain stable in roots. In the tuber, ureides increased by 10 after 11 days whereas amino compounds were unchanged.

CONCLUSIONS

Tuber plays an important role in sustaining nitrogen fixation after detopping. In the presence of tuber, N fixation is maintained at 30% of the control after stem cutting. We showed a transient accumulation of nitrogen fixation products (ureides and amino compounds) in nodules and then a translocation and accumulation in tubers. As a result, tuber accumulated N fixation products which were then utilized for heterotrophic regrowing.

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ADVANCED TECHNOLOGY FOR AGRICULTURAL RESOURCE MANAGEMENT

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Available advanced technology could ease the decision making process for agricultural resources. Although the technology is currently available, its arrangement in a concise and integrated manner dedicated to agricultural applications requires much effort and validation. The Agricultural and Environmental Geographic Information Systems (AEGIS) is one of such technological tools lacking validation.This paper discusses the use of advanced technological tools in the development of a methodology to aid the decision making process of planners and administrators of land and water resources. The tools used in this project are crop simulation models (DSSAT), soil erosion models (RUSLE, WEPP), a chemical transport model (GLEAMS, CREAMS), a relational data base management system (DBASE IV) and a geographic information system (PC-ARC/INFO).