

Influence of integrated weed management practices on soil respiration, soil enzymatic activity, nodulation and yield in groundnut (*Arachis hypogaea* L.)

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ABSTRACT

Field experiment was conducted to study the influence of integrated weed management practices on nodulation, yield and soil enzymatic activities including respiration in groundnut. The weed free check (3 IC at 20, 30, 40 DAS + 2 HW at 45 DAS and 70 DAS) absolutely free from herbicides recorded more number of total nodules plant⁻¹ as well as nodule dry weight, higher soil enzymatic activities viz., phosphatase, dehydrogenase and soil respiration. Alachlor @ 1.5 kg ha⁻¹ pre-emergence + 3 IC at 20, 30, 40 DAS + 1 HW at 45 DAS (82.98 µg) drastically reduced the soil enzymatic activity. Pre-emergence application of Pretilachlor @ 1.5 kg ha⁻¹ + 3 IC at 20, 30, 40 DAS + 1 HW at 45 DAS increased the pod yield of groundnut.

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Key words : Integrated weed management, Soil enzymatic activity, Hand weeding

INTRODUCTION

Groundnut plays an important role in boosting oilseed production in the country. It has an outstanding nutritive value with 40-45 per cent oil, 25 per cent protein and 18 per cent carbohydrates in addition to minerals, vitamins and essential amino acids. This crop can withstand short period of drought at the initial stages and also enrich soil through nitrogen fixation and through addition of organic matter in the form of leaves at maturity. Weed infestation declines the productivity about 18 per cent in oilseeds (Gupta, 2003). Adoption of either manual, mechanical, chemical or biological weed control method alone cannot solve the problem. Hence, effort was made to manage weeds through an integrated approach which is more economical and viable.

It is well known that enzymes in soil contribute to the total biological activities in the soil environment because they are intimately involved in catalyzing reactions necessary for organic matter decomposition, nutrient cycling, energy transfer, and environmental quality (Dick, 1994 and Dick, 1997). Enzyme activities often provide a unique integrative biological assessment of soil function, especially those catalyzing a wide range of soil biological processes, such as dehydrogenase, urease, phosphatase etc. (Nannipieri *et al.*, 2002). Enzyme activities control rates of soil nutrient cycling and are valuable indicators of soil microbial diversity. Measurement of the activity of

the soil micro flora provides indices of the biological state of the soil and hence the soil fertility. Therefore, changes in soil biological and biochemical properties, such as the soil enzymes activities and soil respiration, may be indicative of and extremely sensitive to changes in soil health (Pankhurst *et al.*, 1995). In soil ecosystems, phosphatases are believed to play critical roles in P cycles (Speir and Ross, 1978) as evidence shows that they are correlated to P stress and plant growth also, good indicators of soil fertility. Soil enzyme activity acts as an additional diagnostic index of soil fertility and its changes as a result of human activity especially through intense agricultural practices. In view of this, the present investigation was carried out to find out the effect of integrated weed management practices on nodulation, yield and soil enzymatic activities in groundnut.

MATERIALS AND METHODS

A field experiment was conducted in a *Vertisol* at the main agricultural research station, Dharwad under long term experimental trial during *Kharif* 2008. The experiment was laid out in RBD with three replications and six treatments. The treatment combinations comprised of recommended herbicides and mechanical weeding practices viz., T₁: Alachlor @ 1.5 kg ha⁻¹ pre-emergence + 3 Inter cultivation (IC) at 20, 30, 40 DAS + 1 Hand weeding (HW) at 45 DAS, T₂: Pretilachlor @ 1.5 kg ha⁻¹

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