

Influence of tillage and weed management practices on weed growth and yield of maize-sunflower cropping system

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ABSTRACT

Field experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during *kharif* and *rabi* seasons of 2005 and 2006 to study the weed population dynamics, and crop productivity in maize – sunflower cropping system as influenced by tillage and weed management methods. Among the tillage methods, weed density, weed dry weight were lesser under conventional tillage- conventional tillage. The weed control efficiency was higher under CT-CT during both the years. Lower total weed density and weed dry weight and higher weed control efficiency was recorded by hand weeding on 20 and 40 DAS, which was followed by pre-emergence application of herbicide followed by hand weeding on 40 DAS. Conventional tillage- CT with hand weeding twice recorded higher grain and seed yield of both maize and sunflower during both the years.

Key words : Weed management, Maize, Sunflower, Weed index, Yield.

INTRODUCTION

The world food grain production loss due to weeds was estimated to be 287 million tones accounting for 11.5 per cent of the total food production. Costs on weed control are the largest variable cost in most crop cultivation. In India, weed management accounts 30-50 per cent share of the total cost of cultivation (Bhan, 1997). Timely weeding after the crop emergence is not feasible due to demand and cost of agricultural labourers during peak cultivation period and frequent rainfall in monsoon season. These warrant the adoption of pre-sowing weed control methods in order to reduce the weed competition after the establishment of the crops.

Tillage is the mechanical manipulation of surface soil to provide a favourable environment for the germination and proper development of seeds in addition to suppression of native weeds. Tillage can affect weeds directly, as in the destruction of annual weeds during seed bed preparation, or the effect may be more subtle, as in the shift from large seeded broad leaved weeds to small seeded weeds in reduced tillage systems (Chinnusamy *et al.*, 2002). Hand weeding is labour intensive, costly and time consuming and often needs to be repeated at different intervals. Besides, frequent rainfall during cropping season does not permit manual weeding at the appropriate time. Thus, to eliminate weed competition from the germination stage of the crop and to reduce the yield losses, chemical control has become inevitable. However, indiscriminate use of herbicides may lead to other problems such as shift in weed flora, environmental pollution, herbicide resistant weeds, etc. Thus, there is a need for integrating two or more means of weed control for effective and

economic management of weeds. Hence, a field experiment was under taken to find out suitable tillage and weed management methods to reduce the weed growth and increase yield of maize and sunflower cropping system.

MATERIALS AND METHODS

Field experiment was conducted at Tamil Nadu Agricultural University, Coimbatore during *kharif* and *rabi* seasons of 2005 and 2006 to study the weed population dynamics, and crop productivity in maize – sunflower cropping system as influenced by tillage and weed management methods. The experiments were laid out in split plot design with four replications. Main plot treatment consisted of four tillage methods *viz.*, zero tillage- zero tillage, zero tillage- conventional tillage, conventional tillage - zero tillage and conventional tillage - conventional tillage for maize- sunflower cropping system. Three weed management methods *viz.*, hand weeding on 20 and 40 DAS, pre-emergence herbicide (atrazine 0.5 kg ha⁻¹ for maize and pendimethalin 1.0 kg ha⁻¹ for sunflower) application followed by hand weeding on 40 DAS, along with an unweeded check for both the crops consisted the sub plot treatments.

The first crop of maize was raised during *kharif* (June-Sep) 2005 and 2006 and the second crop of sunflower during *rabi* (Oct-Dec) 2005 and 2006. Maize variety Co-1 with duration of 105-110 days and sunflower variety Co-4 with duration of 85-90 days were selected for the study. In zero tillage the seeds are dibbled in the stubbles of the previous crop without any tillage or soil disturbance, except that which is necessary to place the

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