

damage due to weeds vary with the nature, intensity of weed infestation and duration for which weeds compete with maize plants. Reduction in yield varying from 25 to 80 percent is quite common (Gupta and Gangwar, 1967; Moolani, 1965).

Contribution of weed management techniques has been well documented. Hussain et al. (1986) reported that the average number of hoeings practiced by the group of farmers getting high yield (> 4 t/ha) in maize crop was higher than that getting low yield (> 2.5 t/ha) and the differences were found significant at five percent level of probability. Sarwar and Nawaz (1986) observed that the herbicide Primextra 500 FW (Metolachlor + atrazine) at 2.5 kg a.i./ha. pre-emergence) and hand weeding controlled most of the weeds and increased the grain yield of maize significantly. Khan (1979) found that herbicide application controlled 65 to 90 percent weeds of maize crop, and consequently 100 to 150 percent more grain yield was obtained as compared to the unweeded control plots. He further added that chemical method of weed control proved more effective than the mechanical one. On the other hand, Rana (1980) was of the view that hand weeding was the most effective method of weed control in maize crop, but it was more expensive than chemical treatments. With these points in view, the present study was conducted to examine the present weed control methods and possibilities of herbicide use which is presently considered to be the latest weed control technology in the world.

MATERIALS AND METHODS

The information used is based on a number of surveys conducted by a multidisciplinary team of maize

agronomists, agricultural economists and rural sociologists. In September, 1984, farmers were interviewed informally without the use of a questionnaires but guided by a checklist of important issues to be covered. The purpose of this survey was to understand farmers' management practices. The informal survey was followed by a survey at the harvest time. In this survey a questionnaire was used to record management practices and other important aspects of the farming systems. In addition, a sample of 2m x 2m plots (three plots in each field) was earmarked randomly in the 98 fields for which information on management practices was collected. These subsamples were harvested, weighed and shelled to estimate yields, density and stalk yields, following the methods described in Catling et al. (1983). Finally a formal survey was conducted to understand farmers' perceptions and opinions about local versus recommended management practices. Data were analysed on an Apple IIe micro-computer using the package, Apple Interactive Data Analysis (AIDA).

RESULTS AND DISCUSSION

A. FARMERS' EXISTING PRACTICES OF WEED CONTROL

Survey data showed that weeds were a problem in early crop stages because of heavy rains and delayed planting. Farmers were found to attempt control of early weeds by hoeing and interculture with bullocks where as in later crop stages, farmers cut weed from maize fields for fodder.

Approximately 90 percent of farmers practiced some form of weed control (Figure 1). Fifty eight percent controlled weeds through hoeing only, and 29 percent practiced interculture with

bullocks in addition to hoeing. Few farmers with large holdings and having line sown fields, practiced interculture. Most farmers in the Mardan district have small holdings and can manage one or two hoeings in addition to interculture. Besides practice of interculture depended upon bullock ownership (Table 1). Eighty one percent of bullock owners performed interculture in addition to hoeing, whereas non bullock owners practiced only hoeing (67 percent). No herbicide was used for weed control due to cash constraints and also due to the weeds being an important source of fodder for the farmers of the area. These results are closely related with Sheikh et al. (1987) who conducted a farm level survey in the Potwar Plateau of Punjab and found that farmers do not apply weedicides in maize crop because of financial constraints (60 percent) and use of weeds as fodder (18 percent).

Table 1. The relationship between weed control methods and bullock ownership in the Mardan District.

Bullock Ownership	Weed control methods	
	Hoeing only (percentage of fields)	Hoeing + interculture
Own bullock (60%)	33	81
No bullock (40%)	67	19
All farmers (100%)	100	100

Chi square = 5.05 Probability = 0.001

B. EFFECT OF WEED CONTROL METHODS ON GRAIN YIELDS OF IRRIGATED MAIZE

(i) *Hoeing*: Up to one tonne more maize grain was obtained with one or two hoeings as compared to no hoeing. Average yield with hoeing was 3.6 t/ha

compared to 2.6 t/ha without hoeing (significant at one percent level) (Table 2). These results are in agreement with Sarwar and Nawaz (1986) who obtained 3.4 t/ha maize grain yield with weeding by 'Rumba' which was 49 percent more than no weeding. Similarly Sarwar et al. (1987) reported that weeding by rotary hoe gave 3.7 t/ha grain yield which was 59 percent higher than unweeded check.

Table 2. Effect of hoeing on the grain yield of irrigated maize

Weeds controlled by hoeing	Percent of farmers	Average yields (t/ha)
Yes	87	3.6
No	13	2.6
All farmers	100	3.5

F = 7.97 Probability = 0.006

(ii) *Interculture*: An additional 0.9 t/ha maize grain yields was obtained if seeling was practiced in addition to hoeing (significant at one percent level) (Table 3).

Table 3. Effect of seeling (interculture by bullock) in addition to hoeing on the grain yield of irrigated maize

Weeds controlled by interculture/hoeing	Percent of farmers	Average yields (t/ha)
Yes	32	4.1
No	68	3.2
All farmers	100	3.5

F = 13.24 Probability = 0.0007

Farmers have two major objectives in maize production, viz grain for their own food and fodder for animals. The

maize fodder consist of dry stalks (tanda), green stalks, and weeds. So an acceptable technology, must fulfill these two objectives. With the local methods of weed control, how much tedious and uneconomical they may be, the objectives of grain and fodder both can be achieved. With the herbicide technology obviously grain yield will increase but the second objective i.e. weeds for fodder can not be achieved. The result is that farmers will not use herbicide unless the economic return from the use of herbicide is very high or the farmers have an alternate source of fodder for their animals.

Under this situation it can be suggested to have a separate fodder plot but limited land holdings in district Mardan will not allow the small farmers to allocate a separate plot for fodder. An alternate solution is to disaggregate the technology package into two sub packages i.e. herbicide use with a high plant density or local weed control methods and low plant density. In the former case maize fields can be thinned throughout the season for fodder purpose while in the later case weeds can be controlled by seeling or hoeing at early stage of crops, to get good grain yield and at latter stages farmers can use weeds to feed their animals as these weed control practices do not provide a complete control of weeds.

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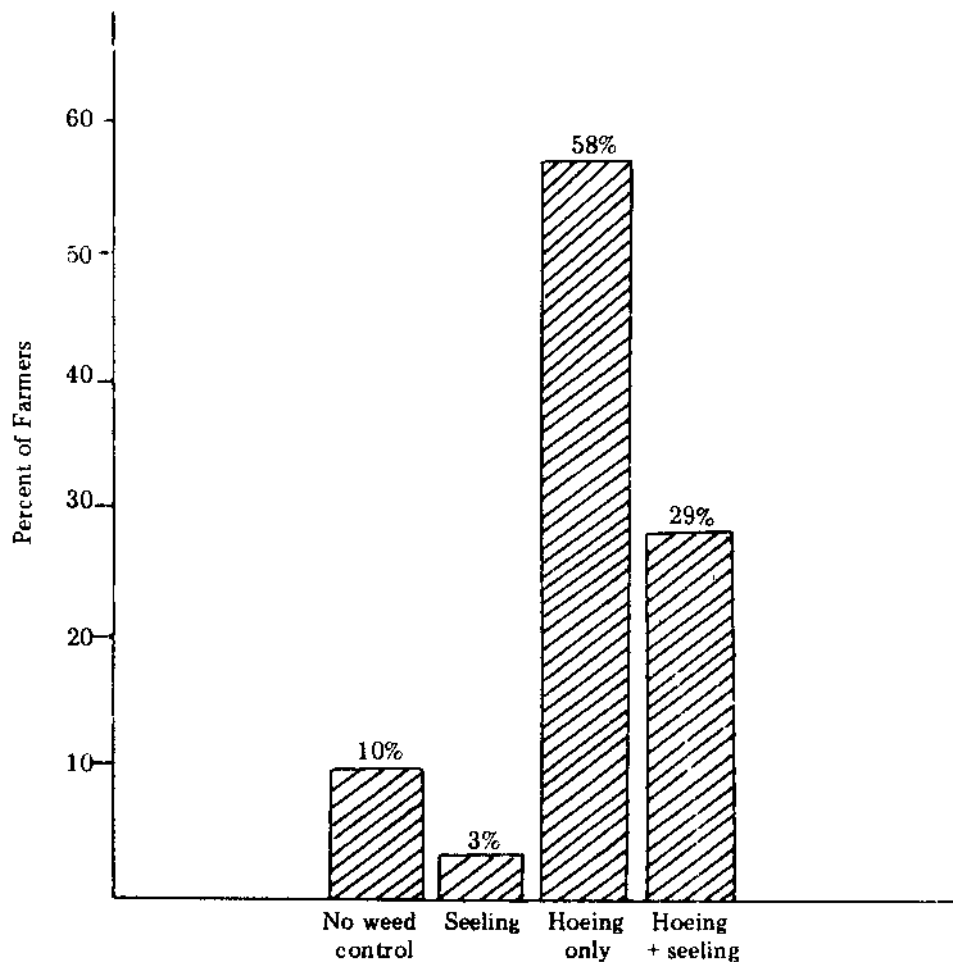


Figure 1 Distribution of farmers according to weed control method for maize in Mardan district.

Farmer's Practices of Weed Control and their Effect on Yields of Irrigated Maize in Mardan District – Results of Farm Level Surveys, 1984

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ABSTRACT

This paper is based on a series of surveys conducted in irrigated area of Mardan district during the year 1984 by social scientists and agronomists. Hoeing was found to be predominant method for weed control in this district. Majority (more than 50 percent) of the farmers practiced two hoeings. For one hoeing 20 mandays were required per hectare which implied that for two hoeings the cost of weeding was more or less Rs.800/ha. No herbicide was being used for weed control; however herbicide use had the potential because 5 litres of Primextra (Metolachlor + atrazine) would cost the farmers Rs.650/ha. However, most farmers were not going to adopt herbicide because they were of the view that herbicide would involve direct cash cost, whereas hoeing was practiced by family labour. Survey results indicated that only those farmers who employed considerable amounts of hired labour for weed control would be willing to apply herbicides.

Average yields with hoeing were 3.6 t/ha compared to 2.6 t/ha without hoeing (significant at one percent level). The farmers who practiced interculture by bullocks in addition to hoeing, obtained 0.9 t/ha more yields than those farmers who practiced only hoeing and the differences were found significant at one percent level of probability.

INTRODUCTION

As a cereal crop, maize is second to wheat in Mardan district. It has, therefore, attained a dominant position in the farming systems of this area. It is primarily grown for food, but is also used as fodder and feed for livestock. Recently the potential demand for maize is increasing rapidly. With the expansion of the poultry industry, it is quite likely that Pakistan will need to import maize and other feed grains in the near future (Amir, 1986). Despite its importance, official statistics show that maize yields are still well below its potential level (3.5-4.0 t/ha) in Mardan district (Sarwar and Nawaz, 1986).

There are so many factors which can boost up yield and total production of this important grain crop to the desired level, one of them being the proper weed control practice. Since weeds compete with maize for all the necessary growth requirements, the crop growth and yield potential are seriously hampered and the cost of production increases. The extent of

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