

SYNOPSIS

Dissertation II

(AGR 690)

“Effect of chemical weed management on growth and yield attributes in sorghum kharif”

Submitted To

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CERTIFICATE

This is to certified that this synopsis entitled “**Effect of chemical weed management on growth and yield attributes in sorghum kharif**” submitted in partial fulfilment of requirements fir degree – Master of Science in Agronomy by **Gurpreet Singh, Registration no. 11614067** to Department of Agronomy, School of Agriculture, Lovely Professional University, has been formulated and finalized by the student himself on the subject.

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DECLARATION

I hereby declare that the project work entitled — “**Effect of chemical weed management on growth and yield attributes in sorghum kharif**” is an authentic record of my work carried at **Lovely Professional University** as requirements of Project work for the award of degree - Master of Science in Agronomy, under the guidance of **Dr. Mahesh Kadam**, Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India.

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EFFECT OF CHEMICAL WEED MANAGEMENT ON GROWTH AND YIELD OF SORGHUM KHARIF

INTRODUCTION

Sorghum (*Sorghum bicolor (L) Moench*) is the most important cereal crop in world after wheat (*Triticum aestivum*), rice (*Oryza sativa*), maize (*Zea maize*) and barley (*Hordeum vulgare L*). Sorghum has multiple uses as grain, fodder and bio energy crop. India is the largest producer of sorghum in world followed by Mexico. Sorghum primarily produced in Maharashtra, Andhra Pradesh, Northern dist. Of Karnataka these three states account 80% of all India production. During 2010-11, world sorghum grain production was about 55.7 million tones. Area and production of sorghum during 2010-11 was 7.06 m ha. 1.41 million tonnes was grain production of sorghum in Karnataka state and Karnataka is second largest producer of sorghum in India. Sorghum is cultivated in 41 m ha to produce 64.20 million tonnes. Major areas are North America, Northeast China and Deccan plateau of central India.

Weeds emergence fast and grow rapidly in sorghum. Presence of weeds reduce the photosynthetic efficiency, dry matter production, reduce sink capacity of crop resulting in poor grain yield. The reduction in yield ranging between 40-80% during growth of sorghum (Lagoke et al.,1990). Mishra (1997) reported 15-40% loss in grain yield. The most critical period for crop weed competition is 30-40 DAS. Sorghum production suffers greatly due to weed infestation which offers limitation to crop. It was found that weed infestation become unmanageable throughout growing period.

Weeds compete with crop for space, moisture, sunlight and nutrients. Weed infestation in sorghum leads to reduction in yield, effect growth and development, cause harvesting loss, effect quality of plant and grain.

There are various methods to control the weeds i.e. cultural, mechanical, chemical, biological and others. The method is adopted according to effectiveness and economics. Application of method over a given area is based upon climatic conditions of that area. Sometimes if one method is not effective, another can.

-Hand weeding is most effective and widely adopted practice but it is labour and time consuming. In condition when labour is not available, it will not be effective. –Mechanical equipment can be time saving during peak operation. –The use of herbicides lead to quick result and time consuming. Chemical method can be better supplement to conventional method however the weed emergence pattern and application time is important. But continuous

use of herbicides over a prolonged time lead to development of resistance in weeds making them difficult to control and also toxic for soil having residual effect also.

In this research we have taken the herbicide effect i.e. pre and post application of herbicide to the crop in such a way to control the weeds economically which help the crop growth

Keeping the above information in view, an investigation was carried out to study the integrated weed management in kharif season sorghum fodder in Lovely Professional University, Phagwara with following objectives

OBJECTIVES OF STUDY

1. To study effect of chemical weed management practices on weed flora of kharif sorghum
2. To study effect of chemical weed management on growth and yield of kharif sorghum
3. To work out the economics of different chemical weed management practices.

REVIEW OF LITERATURE

Rao *et al.* (2007) reported that pre-emergence application of atrazine @ 0.5 kg ha⁻¹ + 1 hoeing or interculture with peg tooth-weeder at 35 days after sowing, were on par recorded least weed population and weed dry weight and significantly increased green and dry fodder yields of sorghum by 66-67 per cent.

Pankaj Chopra and Angiras (2008) observed that application of atrazine @ 1.5 kg ha⁻¹ significantly reduced the population and dry matter of total weeds as compared to unweeded check, and was on par with acetachlor @ 1.25 kg ha⁻¹ and increased in the grain yield of maize by 75.2 and 71.1 % by these two herbicides. In maize, pre-emergence application @ 1.0 kg a.i. per ha + one IC at 30 DAS of atrazine as spray or sand broadcasting or butachlor as spray recorded significantly lower weed population, weed dry weight, higher weed control efficiency and higher maize grain and stover yield. (Kumar, 2008)

Deshmukh *et al.* (2008) reported that in maize at 30 DAS, higher weed control efficiency was recorded by pre-emergence application of atrazine @ 1 kg ha⁻¹ which was on par with pre-emergence application of atrazine @ 0.75 kg/ha pre-emergence followed by 1 hand weeding at 45 DAS. The same treatment recorded significantly superior weed control efficiency over rest of treatments. In maize, pre-emergence application of atrazine @ 0.75 kg ha⁻¹ at 60 and 90 DAS followed by 1 hand weeding at 45 DAS recorded significantly superior

WCE over rest of the treatments except application of atrazine @ 1 kg ha⁻¹ and weed free check. Similar findings were reported by Kolge *et al.* (2004).

Hanwen Wu *et al.* (2010) reported that, a pre-plant application of glyphosate @ 900 g a.i ha⁻¹ plus 2, 4-D amine @ 900 g ae/ha or dicamba @ 500 g a.i. ha⁻¹ @ 1 mo before sorghum planting given _ 95 % control. Preplant atrazine @ 2,000 g a.i ha⁻¹ controlled flaxleaf fleabane 83 to 100% in sorghum. At-planting atrazine @ 2,000 or 1,000 g a.i ha⁻¹ can be applied to control new emergence of flaxleaf fleabane and grasses, depending on the weed pressure and spectrum. Flaxleaf fleabane reduced sorghum yield to 65 to 98% if not controlled

Seemanthini (2011) revealed that pre-emergence application of oxyfluorfen either @ 0.10 or 0.15 kg ha⁻¹ and atrazine @ 1.25 kg per ha significantly reduced the weed density (2.12, 1.47 and 1.47) and weed dry weight (1.74, 1.47 and 1.80 g) at 30 DAS. Weed control index was significantly higher in these three treatments (84.09, 89.54 and 82.88) compared to rest of the treatments except weed free check and recorded higher grain yield of maize.

J.S. Mishra (2015) revealed that weed control can be achieved with integration of pre emergence herbicides with one mechanical weeding. Atrazine @0.75-1 kg per hectare has broad spectrum weed control.

Leandro et al., 2016 stated that Atrazine 2 1.5 Kg per ha can be recommended for controlling Ipomea indivisa in Sorghum and it show higher selectivity to yield component for BRS 509 and BRS 506 sorghum cultivar. Tembotrione and flumioxazin use with integration of S-Metalochlor show high toxicity. S-metolachlor @ 1.4 kg per ha showed higher phytotoxicity to plant.

MATERIAL AND METHODS

Technical programme

- A) Name of experiment: Effect of chemical weed management on growth and yield attributes in sorghum kharif

B) Location: The experiment conducted on agriculture research farm, Lovely Professional University, Phagwara(Punjab)

C) Experimental details:

1. Year of experiment : 2017-2018
2. Recommended dose of fertilizer : 125:60:40kg N,P,K/hec
3. No. of treatments : 7
4. No. of replication : 3
5. Total no. of plots : 21
6. Plot size : 4m * 5m
7. Dates of sowing : 2nd week July,2017
8. Experiment design : Randomized complete block design
9. Crop : Sorghum

10. Variety : Sugar graze

The details of the experiment with regard to treatments, design adopted and plot size are given below.

Treatment details

The experiment consisted of 7 treatments and the details are as follows

T0: Control

T1: Atrazine (50%) @0.25kg a.i. per acre (PRE) fb 2-4D(50%) @ 0.35 L per acre(POST) at 35 DAS.

T2: Atrazine(75%) @0.37kg a.i. per acre(PRE) fb Atrazine (50%) @0.25kg a.i per acre(POST) at 35 DAS.

T3: Pendimethalin(100%) @0.85 L a.i per acre (PRE) only

T4: Pendimethalin(50%) @0.42 L a.i per acre (PRE) fb 2,4-D(50%) @0.35 L per acre(POST)+ Atrazine(50%) @ 0.25 kg a.i. per acre (POST) at 35 DAS.

T5: Pendimethalin(75%) @0.63 L a.i. per acre (PRE) fb Tembotrione(50%) @0.25 L a.i. per acre(POST) + 2-4D(50%) @ 0.35 L a.i. per acre (POST) at 35 DAS.

T6: Tembotrione(100%)@ 0.50 L a.i. per acre(POST) + Atrazine(100%)@ 0.25 kg a.i. per acre (POST) only at 35 DAS

(PRE = Pre emergence, POST = Post emergence, DAS = Days after sowing, fb = followed by, a.i = active ingredient)

Cultural operations

Land Preparation

The land will be ploughed once, clods will be crushed by using spring cultivator twice followed by two harrowing. Stubbles and weeds will be cleaned from the experimental area and it will be brought to fine tilth and leveled to prepare fine seed bed.

Seeds and sowing

The sorghum (sugargraze) seeds have been sown @ 4-5 kg per acre on 14th July 2017 .

Fertilizer application

Nitrogen, phosphorus and potassium were applied at the rate of 100:75:25 kg N, P₂O₅ and K₂O per hectare in the form of urea, di-ammonium phosphate and muriate of potash. Nitrogen application made in two splits; 50 % at the time of sowing along with full dose of P and K, and remaining 50 % N were to be top dressed at 30 DAS.

Gap filling

Gap filling was done at eight days after sowing to maintain optimum plant population. Thinning was carried out fifteen days after sowing retaining one healthy seedling per hill.

Application of herbicides

The required amount of herbicides for the experimentation will be applied

Pre-emergence application of herbicides

Pre-emergence herbicides were sprayed uniformly after sowing of the crop. The pre-emergence application was made on the soil surface uniformly by using spray pumps in required amounts followed by various treatments

Post-emergence application of herbicide

Post-emergence herbicides was applied uniformly at 35 DAS as per the treatments

Harvesting

The border row plants along with earheads asl cut manually from all the sides of each plot . First ear heads were harvested from the plants in the net plot and were sun dried. The ear heads were sun-dried, threshed and grain yield per plot will be recorded. Similarly yield per plot will be recorded after sun drying in the field .

Collection of experimental data

Observations on weed at 7 days interval after sowing till 3 weeks

Weed flora

The important weed flora presented in the experimental plot during the period of experimentation will be recorded. In the experimental site, the weed infestation will predominantly consisted of grassy weeds, broad-leaved weeds and sedges. In the field weeds like *Cyperus rotundus* , *Cyanodon dactylon* *Trianthema* species are found

Number of species wise

The number of weeds present in 1 m² area in each plot will counted at 30, 60, 90 DAS and at harvest. These weeds will be further classified into sedges, grasses and broadleaved weeds and their population was recorded.

Weed index (%)

Weed index is the reduction in crop yield due to the presence of weeds in comparison with weed free plot expressed as percentage. In other words weed index expresses the competition offered by weeds measured by per cent reduction in yield owing to their presence in the field (Gill and Vijayakumar, 1969).

$$\text{Weed index (\%)} = \frac{X-Y}{X} \times 100$$

Where,

X = Total yield from the weed free plot

Y = Total yield from the treatment for which weed index has to be calculated

Growth parameters

Five plants from net plot area will be randomly selected and observations on following growth parameters will be recorded at 35, 75 DAS and at harvest.

Plant Height

The plant height was measured from the base of fully opened top leaf to the ground level and expressed in centimeters

Stem Girth

Five plants from each plot were selected and girth of stem was measured either in inches or in mm by vernier caliper and was converted into cm.

No of green leaves

No of green leaves from selected five plants were recorded.

Yield components and yield

The ear from the five plants selected for taking growth observations at the time of harvest will be used for recording following observations on yield components.

Grain yield (q ha⁻¹)

The ears from net plot were threshed, cleaned and grain weight were recorded in kg per net plot and expressed in quintals per hectare.

Grain weight

Weight of grains in each plot was recorded.

ECONOMICS


Economics can be work out with gross income, net income and cost of cultivation. Benefit cost ratio is to be find out.

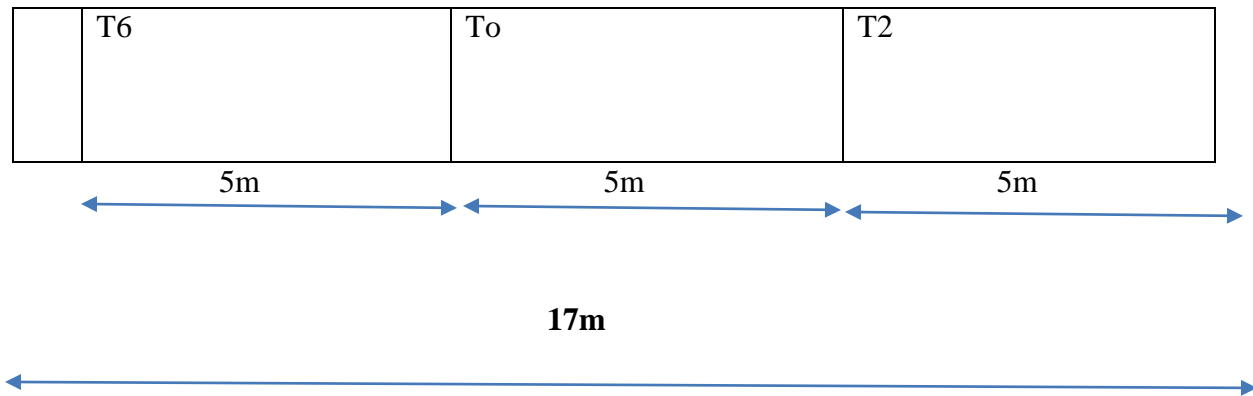
B:C = Total cost of cultivation divided by gross income.

LAYOUT

2m


I R R I G A T I O N C H A N N E L	R1	R2	R3
	To	T6	T5
	T1	T5	T4
	T2	T4	T6
	T3	T2	To
	T4	T3	T1
	T5	T1	T3





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