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## Integrated weed management studies for maximizing the growth and yield of maize crop (*Zea mays* L.)

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### Abstract

A field experiment was conducted at the lovely professional university farm, Phagwara to study the effect of integrated weed management in maize (*Zea mays* L.) variety i.e SV 221 (shaktivardhak seeds) was sown under various treatments, T1 (weed check), T2 (RDF+ metolachlor @1.5l/ha), T3 (RDF+ hand weeding+ Metolachlor@1.5l/ha), T4 (RDF+ Laudis@115ml/acre), T5(RDF +hand weeding+ Laudis@115ml/acre), T6(RDF+2,4D@400ml/ha+ hand weeding), (RDF+ hand weeding). Different growth and yield parameters were recorded during the research work, among all the treatments T3 (RDF + hand weeding+ metolachlor@1.5l/ha) was found to be more effective and record maximum growth and yield parameters and T1 (control) records maximum number of weeds, from the analysis of research done, it has been concluded that T3 (RDF+ hand weeding+ metolachlor@1.5l/ha) was found to be more effective among all other treatments.

**Keywords:** Metolachlor, Laudis, 2,4-D, SV221

### Introduction

Maize crop is grown to a great extent in north India and second most important cereal crop in the world in production Rakesh Kumar., (2014) It is known as the 'King of cereals, because It has very high yield potential compare to other cereal crops. Uttar Pradesh, Rajasthan, Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka and Andhra Pradesh. These states cover two third area of the crop. Madhya Pradesh rank first in maize production. Maize is one of the most important kharif crop cultivated in India. It can be grown in kharif, Rabi, spring. Maize occupies an area of 8.8 million hectare with annual production of 22.3 million tons. In Punjab maize is mostly grown in summer as cereal crop. The yield is not so good as compare to the potential of the cultivars. There may be several factors responsible for the low yield production but the weed infestation is most responsible. Nearly 35-50% of the production is decreases due to weed outbreak in maize crop (Thobatsi., 2009). At initial stages if weeds are not controlled then it results in extreme yield loss. There are nearly 25-30 perennial and annual weeds that grow in maize field. To decrease the yield loss weed management is the primary function of the farmer which mainly at initial stages are like hand weeding, hoeing but theses take more time and require large number of labor. Chemical method is most important an effective Way of controlling weed but can cause environmental pollution when use in excess. The best method to reduce the competition by weeds from the initial stages of growth is use of Atrazine, Metolachlor, etc. which are used as a pre-emergence hecicide. Chemical control is the finer method of weed control as it is faster and gives good result. There are five critical growth phases for irrigation are seedling stage (6-leaf stage), knee high stage, tasselling, 50% silking and dough stages. In kharif season the maize is sown in last week of June and first fortnight of July.

The low yield of maize is low due to inherent low soil fertility and poor nutrient management practices like low use of inorganic fertilizer, no use of organic manures, poor recycling of crop residue and no use of secondary and micronutrient in tribal region. Biofertilizers are capable of fixing atmospheric N or convert insoluble phosphate in the soil, thus increases the fertility, sustainability and act as supplement chemical fertilizer of the soil Balasubramaniam & Palaniappan., (2004)

Maize is an oldest human cultivated crop. The origin of maize is believed to be 7000 years ago in Mesoamerica region when it was used and grown as a wild grass. Cultivation of maize crop is spread widely after European discovery of Americas in 15th century. Maize belongs to grass family Gramineae. Maize is important cereal grain crop, which is widely grown with high level of photosynthetic activity. Maize is 3rd important crop at world level after wheat and rice. Maize has a power to adapt different type of environmental conditions due to its greater

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adaptability. Maize can be lost its quality due to fungi and such fungus leads to adverse effects on human health as well as animal health. Maize has higher yield per hectares among other cereals and remains 3 rd Position at the world level after wheat and rice in the terms of importance.

### Objectives

- To observe the effects of chemical control and hand weeding on weed control and the yield.
- To study the effect of weeds on maize growth parameters.
- To study economics of various weed management practices.

### Material and Method

The experiment was conducted at field of Lovely Professional University, Phagwara, Punjab, in year 2021. The farm is situated at altitude 232 meter above sea level. The soil status of experimental site is sandy loam, fertile and free from weeds, having good drainage system.

**Table 1:** Treatment details

T1	Weed Check
T2	RDF+ Metolachlor@1.5l/ha
T3	RDF+Metolachlor@1.5l/ha + Hand weeding
T4	RDF+ Laudis@115ml/acre
T5	RDF+ Hand weeding + Laudis@115ml/acre
T6	RDF+ 2,4-D@ 400ml+ hand weeding
T7	RDF+ Hand weeding

### Result

**Table 2:** Cob plant<sup>1</sup>

Treatments	No of cobs
T1	1.433±0.088
T2	1.367±0.033
T3	1.567±0.33
T4	1.400±0.058
T5	1.300±0.058
T6	1.367±0.067
T7	1.467±0.120

Cobs per plant considerably affected by different weed control treatments. The maximum number of cobs was recorded in T3 (RDF+ hand weeding + metolachlor@1.5l/ha) was 1.56 and followed by T6 (RDF+2,4-D@400ml/ha+ hand weeding) was 1.4. Tatarwal *et al.*, (2011) recorded highest number of cobs per plant were Recorded with 150% RDF which was at par with RDF+ 10t/ha FYM. Kalhapure *et al.*, (2013) <sup>[4]</sup> found the highest cob number per plant was in plot treated with 25% RDF + Biofertilizer (PSB +Azotobactor) + Green manuring with sunhemp and lowest number of cobs per plant was observed in control.

**Table 3:** Cob length

Treatments	Cob length (cm)
T1	11.304±0.366
T2	11.899±0.112
T3	13.750±0.451
T4	12.268±0.329
T5	12.542±0.124
T6	11.813±0.097
T7	12.301±0.270

Cob length was considerably affected by a different weed control treatments. The highest cob length was observed in T3

(RDF +hand weeding+ metolachlor@1.5l/ha) was 13.74cm followed by T5 (RDF+ Hand weeding+laudis@115ml/acre) was 12.54cm. Krishnaprabhu (2020) during his study found that soyabean green manure and mulching with fresh *Eupatorium* 10t/ha with one hand weeding shows the highest cob length. Javid Ehsas *et al.*, (2016) <sup>[3]</sup> Recorded highest cob length in T2 treatment (Atrazine@0.75kg/ha + pendimethalin @0.75kg/ha) best yield attributes are found under T2 as there is less or no weed due to pre- emergence herbicides.

**Table 4:** Chlorophyll Content

Treatments	Chlorophyll at 30 DAS	Chlorophyll at 60 DAS	Chlorophyll at 90 DAS
T1	48.600±0.498	46.670±0.296	35.0±2.00
T2	58.127±0.4.3	52.840±1.519	37.80±2.06
T3	59.700±0.251	55.610±0.282	41.433±0.98
T4	58.593±0.642	55.100±1.377	36.36±1.732
T5	57.557±1.629	49.953±0.484	40.667±1.453
T6	58.580±580	51.967±0.663	39.00±0.577
T7	58.120±0.862	55.053±0.643	40.00±1.528

### Chlorophyll content

At 30 DAS the maximum chlorophyll content was recorded in T3 (RDF+ hand weeding+ Metolachlor@1.5l/ha) was 59.700 followed by T4 (RDF+ Laudis@115ml/ha) was 58.593, at 60 DAS the maximum chlorophyll content was recorded in T3 (RDF+ hand weeding+ metolachlor@1.5l/ha) was 55.910 followed by T4(RDF+ Laudis@115ml/acre) was 55.10, at 90 DAS the maximum chlorophyll content was recorded in treatment T3(RDF+ Hand weeding Metolachlor@1.5l/ha) (41.43 SPAD value) followed by T5 RDF+ Hand weeding + laudis@115ml/acre) was(40.65SPAD value). Luqman *et al.*, (2021) found that the chlorophyll content was maximum (50SPAD units) while using MB Plough in comparison to Cultivar (49 SPAD unit).

**Table 5:** Protein content (%)

Treatments	Protein content (%)
T1	7.01±0.445
T2	8.24±0.247
T3	8.62±0.095
T4	8.13±0.130
T5	7.51±0.207
T6	7.62±0.261
T7	7.58±0.285

Protein content was considerably affected by different weed control treatments. Highest protein content was recorded in treatment T3 (RDF+Metolachlor@1.5l/ha+handweeding) was 8.62% followed by T2 (RDF+ Metolachlor@1.5l/ha) was 8.24 and lowest protein % was recorded in T1 weed check was 7.013. F.A.Sharara., (2005) <sup>[2]</sup> (14.51-18.23%) protein content increased when we apply Gesaprim at average and high concentration in maize seeds.

**Table 6:** Yield hectare<sup>1</sup>

Treatments	Yield/hectare (kg)
T1	48.40±0.66
T2	51.44±0.58
T3	57.58±0.74
T4	54.62±1.43
T5	50.82±0.23
T6	50.35±0.68
T7	52.10±0.59

Yield per hectare was significantly affected by different chemical treatments. The maximum yield per hectare was recorded in T3 (RDF+handweeding+Metolachlor@1.5l/ha) was 57.58q followed by T4 (RDF+Laudis@115ml/acre) was 54.62q and the minimum yield was recorded in T1 (weed check) was 48.40q. Satyendra Kumar *et al.*, (2016) [5] conducted an experiment at OUAT, maize research station recorded that application of Atrazine@1.0kg/ha + pendimethaline @750g/ha at 1DAS as P.E was 335.83g/m<sup>2</sup>.

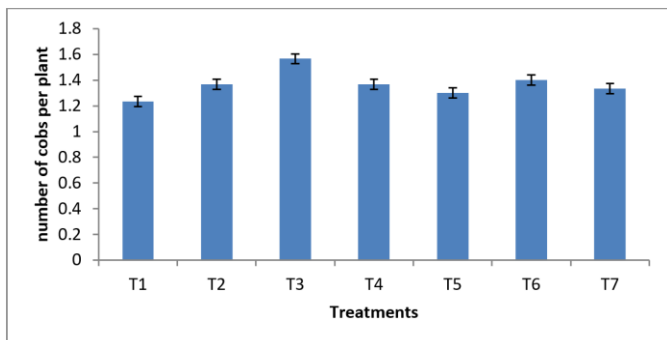


Fig 1: Effect of various treatments on number cobs per plant

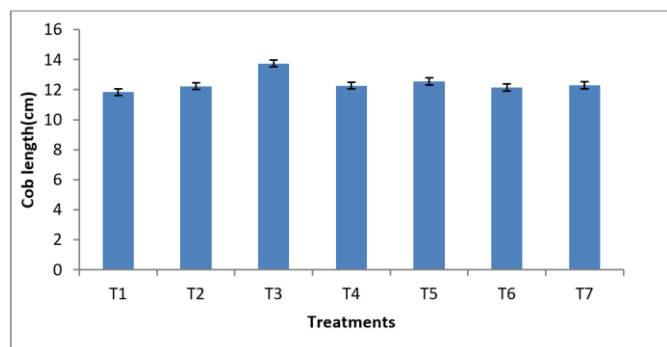


Fig 2: Effect of various treatments on cob length

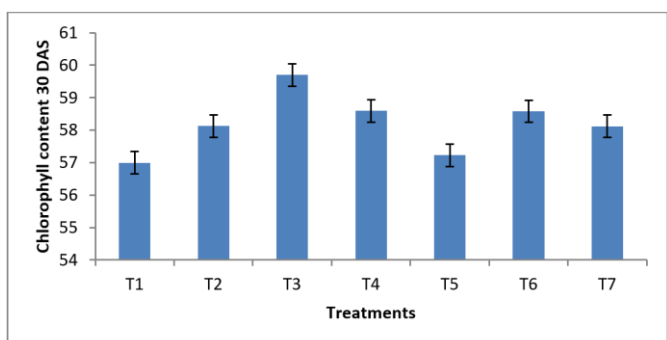


Fig 3: Effect of various treatments on chlorophyll content at 30DAS

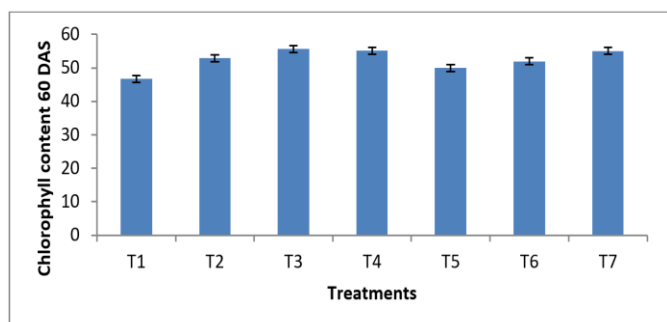


Fig 4: Effect of various treatments on chlorophyll content at 60 DAS

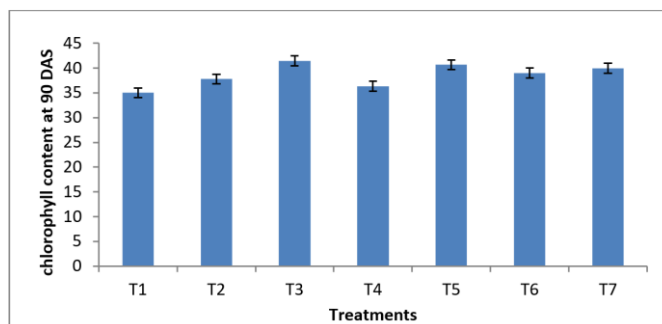


Fig 5: Effect of various treatments on chlorophyll content at 90 DAS

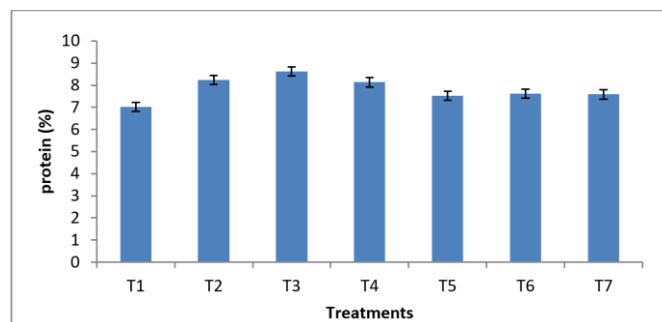


Fig 6: Effect of various treatments on Protein content (%)

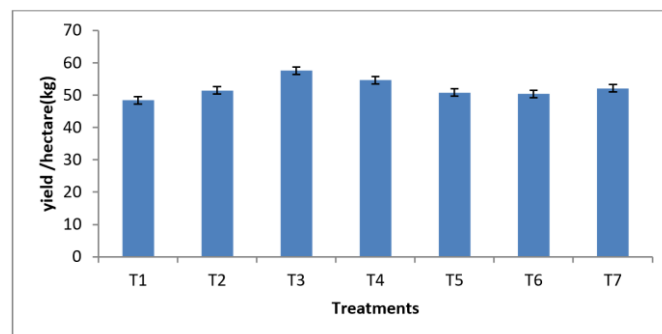


Fig 7: Effect of various treatments on yield per hectare

### Conclusion

T3 (RDF+Metolachlor@1.5l/ha +Hand weeding) recorded maximum number of cobs, maximum cob length, highest protein content, highest chlorophyll content and maximum yield, hence T3 (RDF+Metolachlor@1.5l/ha+ hand weeding) was found to be more effective among all other treatments.

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