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Integrated Weed Management For Maximizing Seed Yield of Fodder Maize Crop (*Zea Mays.* L)

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Abstract

A field experiment was conducted at the farm of Lovely Professional University, Phagwara in 2018-19 to examine the effect of integrated weed management for maximizing seed yield of fodder maize crop (zea mays.l). Variety i.e. P 3401(Pioneer) was tested under various doses of T1 (Weed Check), T2 (RDF + Pendimethalin @1.5kg a.i/ha) , T3 (RDF + Atrazine @1.5kg a.i/ha) , T4 (RDF + Handweeding + Pendimethalin @1.5kg a.i/ha) , T5 (RDF + Handweeding + Atrazine @1.5kg a.i/ha) , T6 (RDF + Pendimethalin @1.5kg a.i/ha + Atrazine @1.5kg a.i/ha) , T7 (RDF + Handweeding) comprising one variety. Yield and growth parameters were recorded during the research work. T5 (RDF+Handweeding+Atrazine@1.5kg a.i/ha) was found effective in maximizing the plant height, no. of leaves per plant, stem girth of maize plant, no. of cobs per plant, cob length, cob weight, seeds per cob, cob girth, test weight, yield per plant, yield per hectare, dry matter of maize plant and T1 (weed control) was effective in maximizing the dry

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weight of weeds and number of weeds. From the analysis of research done, it has been concluded that application of T5 (RDF+Handweeding+Atrazine@1.5kg a.i/ha) was found most effective in comparison to other treatments.

Keywords: Atrazine, Growth, Pendimethalin, Yield

Introduction

Maize is one of the most vital cereal crops in the world agricultural economy both as food for man and feed for animals. It is a miracle crop. It has very high yield potential, there is no cereal on the earth which has so immense potentiality and that is why it is called 'King of cereals'. It is well known that maize is a heavy feeder for both nutrients and soil moisture due to its high productivity. The low yield of maize under Indian conditions may be attributed by number of factors, among them weeds rank as prime enemy. In the near future, agricultural labour will become scarce and expensive, as the drift from the village to cities unlikely to be reversed. Therefore, it is necessary to develop cheaper method of weed control with either herbicides or their combinations with mechanical methods.

India produces 10-14 million tons of maize in kharif season. In India maize is used as a fodder in various states. Maize is a nutritious fodder and also used in poultry feed as a major feed. Developed countries use 70% maize as animal feed and only 5% used by humans. In developing countries 62% maize is consumed as a food and 34% as animal feed and remaining 4% is used as seed and industrial raw material. Maize is mostly used as a raw material by various

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industries such as food industry, textile industry and foundry for the preparation of corn oil, corn flakes, grain cakes, corn starch, custard powder, corn bread, textile dyes, and lactic acid. Maize also a part of human diet. Maize is used as corn oil which is good for human consumption, specially for the heart patients. Demand of maize is increased mostly in developing countries from 1993. The demand increment rate of maize will be 526 million tons to 784 million tons around 2020. Recently maize is used for ethanol production by China and US. Maize is highly earning yield crop. Maize occupies a dominant position due to its multiple uses in the agro based economy of world.

Material and Method

The experimental was conducted at LPU field, School of Agriculture, Lovely Professional University, Phagwara, Punjab, during 2018-2019. The farm is situated at altitude 232 meter above mean sea level and latitude 31.25◦N and longitude 75◦E. The soil status of experimental site is sandy loam soil, well fertile and free from weeds and well tilts soil .Has good drainage and rich in nutrients. The soil experimental field was sandy loam in texture, acidic in reaction with low level of organic carbon, available nitrogen and available P_2O_5 but a medium level of available K_2O.

Treatment Details

Variety i.e. P 3401(Pioneer) was tested under various doses of T1 (Weed Check), T2 (RDF + Pendimethalin @1.5kg a.i/ha) , T3 (RDF + Atrazine @1.5kg a.i/ha) , T4 (RDF + Handweeding

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+ Pendimethalin @1.5kg a.i/ha) , T5 (RDF + Handweeding + Atrazine @1.5kg a.i/ha) , T6 (RDF + Pendimethalin @1.5kg a.i/ha + Atrazine @1.5kg a.i/ha) , T7 (RDF + Handweeding) comprising one variety.

Result

Cob plant^{-1}

Cob per plant was considerably affected by a different weed control treatments. The highest cobs per plant was observed in T5 (RDF+ Hand weeding+Atrazine@1.5kga.i/ha) was 1.62 and followed by T3 (RDF+Atrazine@1.5kga.i/ha) was 1.45 and minimum cobs per plant were observed in T1 (weed check) was 1.13. The cobs per plant were maximum in T5 this show that the T5 (RDF+Handweeding+Atrazine@1.5kga.i/ha) was more affected from all the treatments. Kalhapureet et al., (2013) reported that the maximum number of cobs per plant (1.6) was observed in 25% RDF + biofertilizer (Azotobactor + PSB) + green manuring with sun hump + compost and minimum number of cobs per plant (0.8) was observed in (control). Bakht et al., (2006) observed a significant effect of planting methods in maize crop on number of cobs per plant. Kaur and Mahey et al., (2005) reported that the higher yield in bed planting with one row per bed was due to induced number of cobs for each plant and more grains for each cob than flat sowing

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Table 1 Effect of various treatments on cob plant^{-1}, Cob length, Seeds/cob

Treatments	Cob plant^{-1}	Cob length (cm)	Seeds cob^{-1}
T1	1.13^{e}±.037	14.13^{e}±.06	296.00^{c}±3.60
T2	1.23^{cde}±.032	14.62^{d}±.12	303.00^{c}±3.00
T3	1.45^{b}±.028	14.75^{cd}±.10	330.00^{ab}±3.60
T4	1.34^{bc}±.030	14.30^{e}±.14	321.00^{b}±3.21
T5	1.62^{a}±.041	15.18^{a}±.04	337.47^{a}±3.76
T6	1.27^{cd}±.062	14.87^{bc}±.01	323.33^{b}±2.40
T7	1.21^{de}±.071	15.02^{ab}±.04	319.45^{b}±4.27

Cob length

Cob length was considerably affected by a different weed control treatments. The highest cob length was observed in T5 (RDF+Handweeding+Atrazine@1.5kga.i/ha) was 15.18cm and followed by T7 (RDF + Hand weeding) was 15.02cm and minimum cob length was observed in T1 (weed check) was 14.13cm. The cob length was maximum in T5 this show that the T5 (RDF+Handweeding+Atrazine@1.5kga.i/ha) was more affected from all the treatments. Lone et al., (2013) observed that the maximum cob length without husk(10.90cm) were found in FYM 6t/ha + State recommended dose of NPK and minimum cob length without husk(8.67cm) in

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FYM + Recommended dose of fertilizer. Bakht et al., (2006) observed a significant effect of planting methods in maize crop on cob length.

Seeds cob^{-1}

Seed per cob was considerably affected by a different weed control treatments. The highest seeds per cob were observed in T5 (RDF+ Hand weeding +Atrazine @1.5kga.i/ha) was 337.47 and followed by T3 (RDF+Atrazine@1.5kga.i/ha) was 330.00 and minimum seeds per cob were observed in T1 (weed check) was 296.00. The seeds per cob were maximum in T5 this show that the T5 (RDF+Hand weeding+Atrazine@1.5kga.i/ha) was more affected from all the treatments. Agricultural wastes alone or in combination with reduced rates of NPK fertilizer increased number of seeds per cob of maize compared with un-amended treatment Ogundare et al., (2012). INM including vermin compost give result best in number of grains per cob Kannan et al., 2013). .Kumar (2008) observed that sowing of maize on ridges gave maximum number of rows per cob, number of grains per row, 1000-grain weight and grain yield as compared to flat sowing method. Bakht et al., (2006) observed a significant effect of planting methods in maize crop on number of grains cob^{-1}.

Test weight (100 seeds)

Table 2 Effect of various treatments on test weight (100 seeds), Yield plant^{-1}, Yield hectare^{-1}

Treatments	Test weight (100 seeds)	Yield per plant (g)	Yield hectare^{-1} (kg hac^{-1})

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T1	21.36^{d}±.37	71.56^{e}±.45	50.56^{e}±.34
T2	23.03^{c}±.06	87.92^{d}±2.83	52.21^{d}±.66
T3	24.66^{b}±.18	118.12^{b}±4.34	60.69^{b}±.37
T4	24.46^{b}±.12	103.47^{c}±4.53	58.54^{c}±.38
T5	25.56^{a}±.08	139.69^{a}±3.56	64.19^{a}±.29
T6	23.50^{c}±.10	96.92^{cd}±3.95	57.96^{c}±.03
T7	23.33^{c}±.12	90.38^{d}±5.25	51.93^{d}±.35

Test weight of (100seeds) was considerably affected by a different weed control treatments. The highest test weight of (100seeds) was observed in T5 (RDF+ Hand weeding+ Atrazine @1.5kga.i/ha) was 25.56g and followed by T3 (RDF+Atrazine@1.5kga.i/ha) was 24.66 g and minimum test weight of (100 seeds) is observed in T1 (weed check) was 21.36g. The test weight of (100seeds) was maximum in T5 this show that the T5 (RDF+ Hand weeding Atrazine@1.5kga.i/ha) was more affected from all the treatments. Kumar (2008) conducted a research experiment at New Delhi and reported that kharif maize sown on ridges recorded significantly higher plant height, number of rows per cob, number of grains per row, 1000-grain weight and grain yield as compared to flat sowing method. Agricultural wastes alone or in combination with reduced rates of NPK fertilizer increased 100-seed weight of maize compared with un-amended treatment Ogundare et al., (2012). INM including vermin compost give result best in 100 seed weight and yield Kannan et al., (2013). Kumar (2008) reported that sowing of

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maize on ridges in kharif gave more 1000-grain weight and grain yield as compared to flat sowing method. Bakht et al., (2006) observed a significant effect of planting methods in maize crop on 1000 grains weight.

Yield plant^{-1}

Yield per plant was considerably affected by a different weed control treatments. The highest yield per plant was observed in T5 (RDF+Handweeding+Atrazine@1.5kga.i/ha) was 139.69g and followed by T3 (RDF+Atrazine@1.5kga.i/ha) was 118.1g and minimum yield per plant was observed in T1 (weed check) was 71.56g. The yield per plant was maximum in T5 this show that the T5 (RDF+Hand weeding+Atrazine@1.5kga.i/ha) was more affected from all the treatments. Mt. Pleasant et al., (1994) reported that pre-emergence application of atrazine (1.1 kg/ha) and pendimethalin (1.7 kg) + mechanical weeding reduced the weed density and gave maximum seed yield (6500 and 6000 kg/ha) than other treatments. They also concluded that integrated weed control reduced herbicide usage by 67% and provided adequate weed control.

Yield hectare^{-1}

Yield per hectare was considerably affected by a different weed control treatments. The highest yield per hectare was observed in T5 (RDF+ Hand weeding+Atrazine@1.5kga.i/ha) was 64.19q and followed by T3 (RDF+ Atrazine@1.5kga.i/ha) was 60.69q and minimum yield per hectare was observed in T1 (weed check) was 50.56q. The yield per hectare was maximum in T5

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this show that the T5 (RDF+ Hand weeding+Atrazine@1.5kga.i/ha) was more affected from all the treatments. Mt. Pleasant et al., (1994) reported that pre-emergence application of atrazine (1.1 kg/ha) and pendimethalin (1.7 kg) + mechanical weeding reduced the weed density and gave maximum seed yield (6500 and 6000 kg/ha) than other treatments. They also concluded that integrated weed control reduced herbicide usage by 67% and provided adequate weed control.

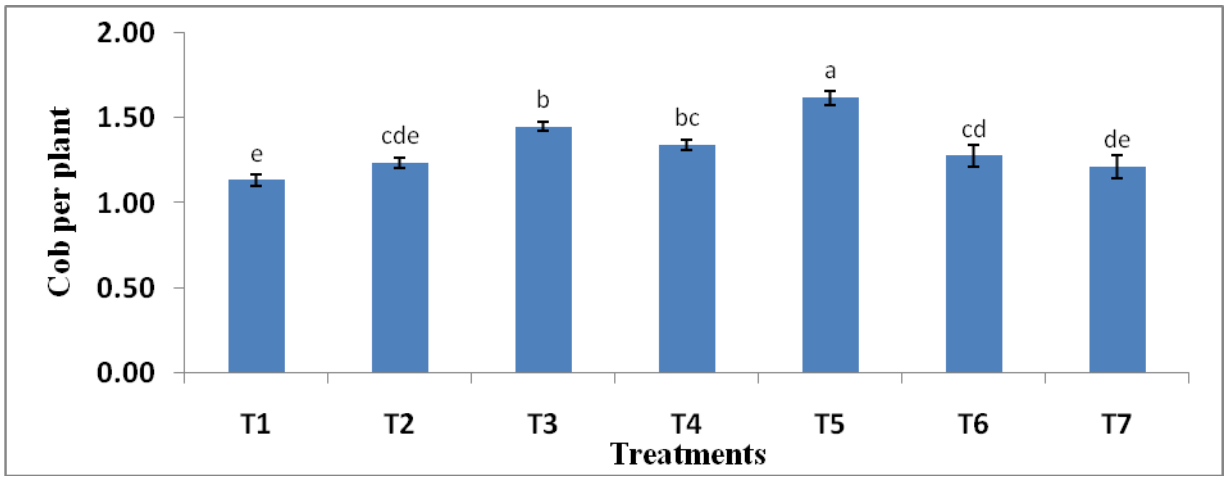

Fig 1 Effect of various treatments on cob plant^{-1}

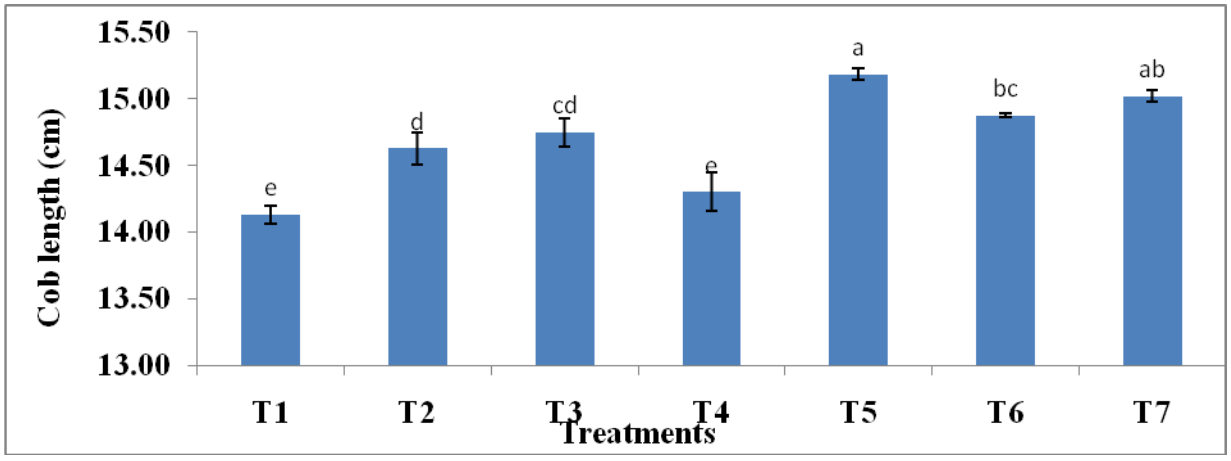

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Fig 2 Effect of various treatments on cob length.

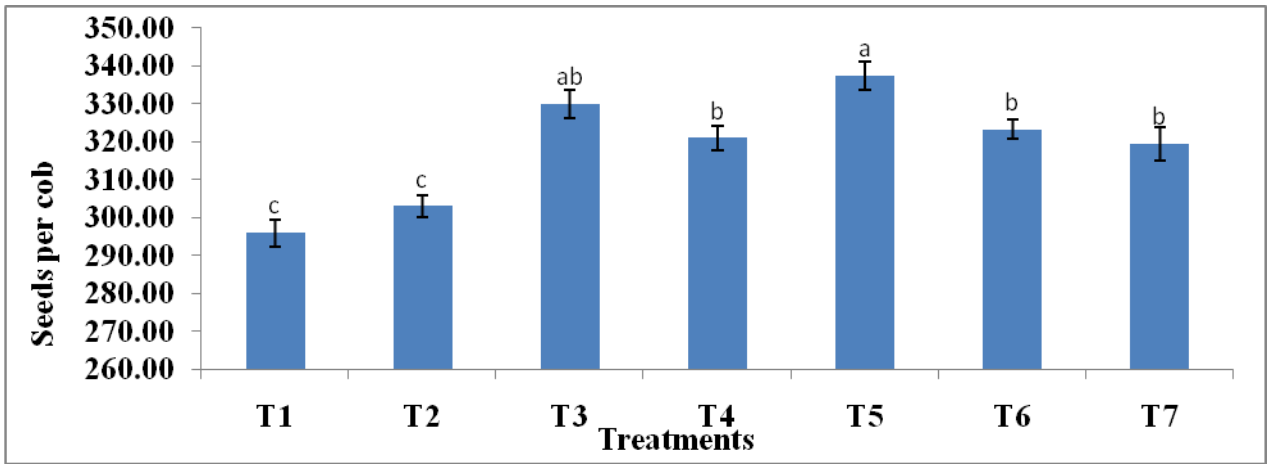

Fig 3 Effect of various treatments on seeds cob^{-1}

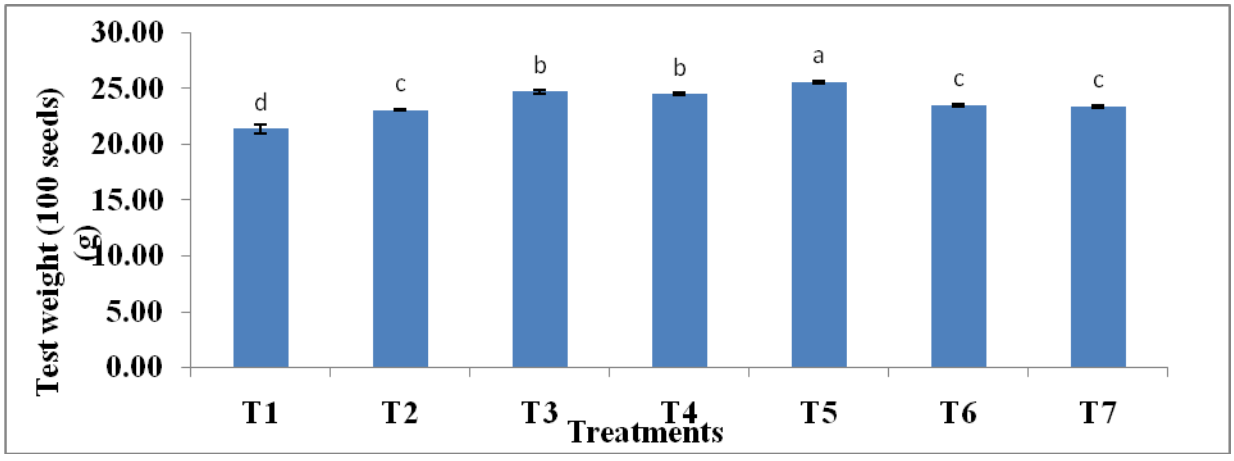

Fig 4 Effect of various treatments on test weight of (100seeds)

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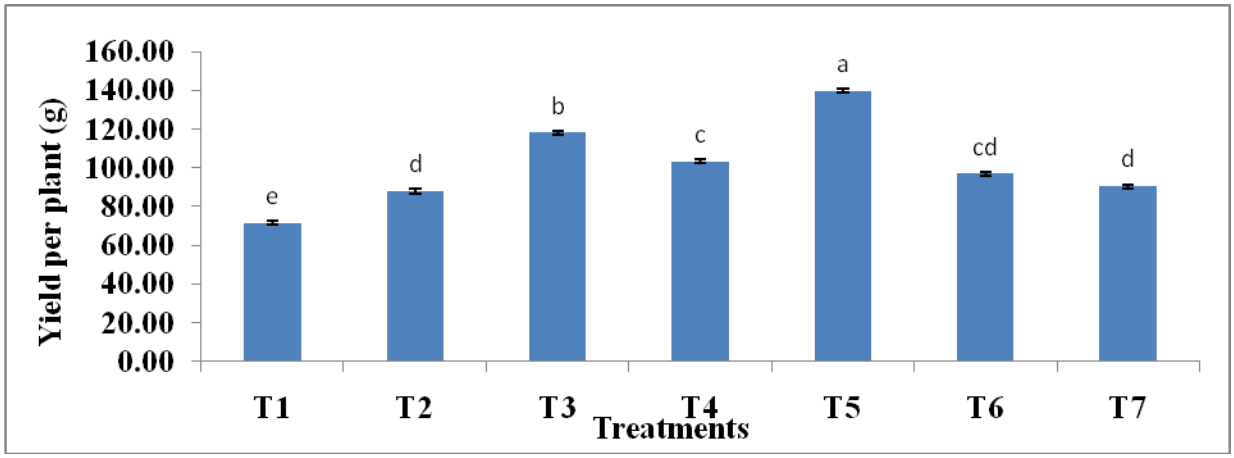

Fig 5 Effect of various treatments on yield plant^{-1}

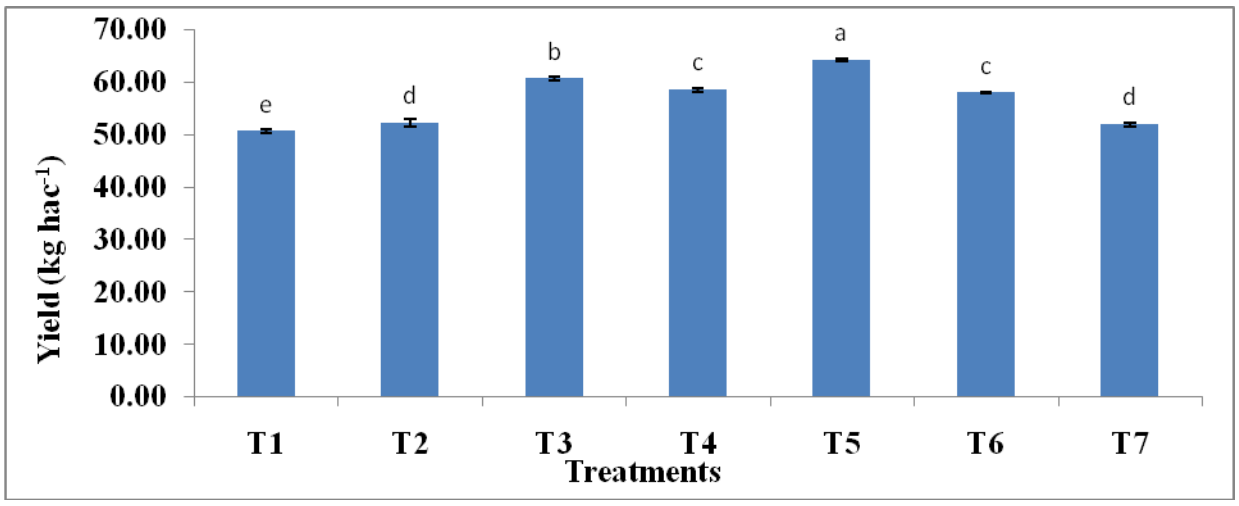

Fig 6 Effect of various treatments on yield hectare^{-1}

Conclusion

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T5 (RDF+Handweeding+Atrazine@1.5kg a.i/ha) was found effective in maximizing the No. of cobs per plant, cob length, seeds per cob, test weight, yield per plant, yield per hectare. From the analysis of research done, it has been concluded that application of T5 (RDF+Handweeding+Atrazine@1.5kg a.i/ha) was found most effective in comparison to other treatments.

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