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Manju Rani Sahu
Student of M.Sc. (Hort.) Dept. of Vegetable science, BTC CARS, Bilaspur (C.G.), India

Madan Kumar Jha
Student of M.Sc. (Hort.) Dept. of Vegetable science, BTC CARS, Bilaspur (C.G.), India

Dr. Sanjay Verma
Scientist Dept. of Horticulture, BTC CARS, Bilaspur (C.G.), India

Bhartii Jha
Student of M.Sc. (Hort.) Dept. of Horticulture OUA &T, Bhubneshwar, Odisha, India

Correspondence
Manju Rani Sahu
Student of M.Sc. (Hort.) Dept. of Vegetable science, BTC CARS, Bilaspur (C.G.), India

Effect of different weed management practices on economics of onion (*Allium cepa* L.)

Manju Rani Sahu, Madan Kumar Jha, Dr. Sanjay Verma and Bhartii Jha

Abstract
The field experiment was conducted during *Rabi* season of 2016-17 at the Horticulture Research cum Instructional farm, BTC CARS, Bilaspur (C.G.). The treatments consisted of ten combination of different agro input management practices viz., T_1 (control weedy check),T_2 (weed free),T_3 (Pendimethalin @ 1.75 kg/ha (pre-emergence)),T_4 (Oxyfluorfen @ 1 kg/ha (pre-emergence)), T_5 (Quizalofop-ethyl @1 kg/ha (Post-emergence)), T_6 (Pendimethalin @ 1.750 kg/ha (Pre emergence) + Quizalofop-ethyl @ 1 kg/ha (Post-emergence)), T_7 (Oxyfluorfen @ 1 kg/ha (Pre-emergence) + Quizalofop-ethyl @ 1 kg/ha (Post-emergence)), T_8 (Two hand weeding at 25 and 45 DAT), T_9 (Black polythene mulch), T_{10} (Organic mulch with paddy straw @ 20 q/ha).The significantly maximum Maximum gross returns (□ 4,55,050.00/ha), net income (□ 3,80,228.81/ha) and benefit: cost ratio (5.08) was recorded in weed free treatment. Among herbicidal treatments maximum gross returns (4,15,170.00/ha) and net income (3,55,064.81/ha) and benefit:cost ratio (5.90) was observed with the application of T_7 (Oxyfluorfen @ 1 kg/ha (Pre emergence) + quizalofop ethyl @ 1 kg/ha (Post- emergence)) applied at 30 (DAT).

Keywords: Pendimethalin, Oxyfluorfen, Quizalofop-ethyl, and onion

Introduction

Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops grown all over the world. It is native of Central Asia and Mediterranean region. It belongs to family Alliaceae and the plant is either biennial or perennial. The stem is erect and an umbel-like inflorescence composed of white or greenish-white small flowers grow at the tip of the stem. The edible bulb is composed of several overlapping layers on a central core. It is popularly known as "Queen of kitchen" because of its characteristic flavour and taste of food. Recent research has suggested that onion in the diet may play a part in preventing heart diseases and other aliments (Sangha and Baring, 2003) [6].

Onion bulb is rich in phosphorus, calcium and carbohydrates. It contains carbohydrates (11.0g), proteins (1.2g), fibre (0.6 g), moisture (86.8 g) and several vitamins like vitamin A (0.012 mg), vitamin C (11 mg), thiamine (0.08 mg), riboflavin (0.01 mg) and niacin (0.2 mg) and also some minerals like phosphorus (39 mg), calcium (27 mg), sodium (1.0 mg), iron (0.7 mg) and potassium (157 mg) (Rahman *et al.*, 2012) [5].

Maharashtra is the leading producer of onion in India and other major onion growing states in our country are Gujarat, Karnataka, Orissa, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Rajasthan, whereas productivity is highest in Gujarat which productivity is 25.43 t/ha. (Anonymous, 2014-2015) [1]. In Chhattisgarh, it is being grown on an area of 20.06(′000 ha) with a production of 308.10(′000) mt and the productivity is 15.36 ton/ha (NHRDF, Nashik). The maximum cultivated area and production of onion is Mahasamund followed by Durg, Kanker, and Raipur district (Anon, 2013) [2].

Weed infestation is the important constraint in onion production, which causes reduction in bulb and seed yield to the tune of 40 to 80% (Channapagoudar and Biradar, 2007). Weeds interfere with development of bulbs and also add cost of cultivation. Weed competition reduced the bulb yield of onion to the extent of 2.35 – 61.8 per cent depending upon the duration of crop weed competition and intensity (Sankar and Lawande, 2011) [7].

In Chhattisgarh, onion is adversely affected mostly by weeds. The weeds grow in all the places of onion fields. Dominant weed species associated with onion are *Cyperus rotundus, Cynodon dactylon, Echinochloa crusgali, Alternanthe ratriandra, Amranthus viridis, Parthenium hysterophorus, Physalis minima, Medicago denticulata,* and *Portulaca oleraceae.* These are mostly associated with onion fields and are responsible for the low yields of onion since these weeds occur easily and grow in all parts of the state.

Material and Method

Economics (Rs)

Cost of cultivation for each treatment was worked out separately gross return (Rs ha^{-1}) was obtained by converting the harvest in to monetary terms at the prevailing market rate during the course of investigation. Net return was obtained by deducting cost of cultivation from gross return. The benefit: cost ratio was calculated with the help of following formula (Reddy *et al*., 2004).

$$\text{Benefit cost ratio} = \frac{\text{Gross return (Rs)}}{\text{Total cost of cultivation}}$$

Result and Discussions

1. Economics

The data represented to Economics of onion under various treatments at different growth stages are presented in 1.

The data related to total cost of cultivation, gross return, net return, benefit: cost ratio of weed management practices are presented in Appendix-F. The detailed common cost of cultivation of onion under different treatments are presented in Appendix D and E, respectively. The net profit ranged from (75,248.81/ha to 3, 80, 228.81/ha). The maximum net profit/ha was recorded under T2 (3, 80, 228.81/ha), while minimum net profit was obtained in (T_1) (75,248.81 /ha).

The gross profit ranged from (1, 31, 440/ha to 4, 55, 050/ha). The maximum gross profit/ha was recorded in T2 (4, 55, 050/ha) where as minimum gross profit/ha was recorded in T1 (1,31,440/ha). Thus, the maximum income (both gross and net) was obtained with T2. The benefit cost ratio ranged from (1.33 to 5.90) depending on different treatments. It was found to be highest (5.90) under the T_7 (Oxyfluorfen @ 1 kg/ha (pre-emergence) + Quizalofop-ethyl @ 1 kg/ha (post-emergence)) and the lowest (1.33) under the Weedy check (T_1).

Table 1: Effect of different weed management practices on economics of onion (*Allium cepa* L.)

Treatment	Cost of cultivation (□/ha)	Yield (q/ha)	Gross realization (□/ha)	Net realization	B:C ratio
T_1 Control (Weedy check)	56191.19	131.44	131440	75248.81	1.33
T_2 Weed free	74821.19	455.05	455050	380228.81	5.08
T_3 Pendimethalin @ 1.75 kg/ha (pre-emergence)	57322.69	349.90	349900	292577.31	5.10
T_4 Oxyfluorfen @ 1 kg/ha (pre-emergence)	58405.19	355.85	355850	297444.81	5.09
T_5 Quizalofop-ethyl @ 1 kg/ha (post- emergence)	58305.19	310.71	310710	252404.81	4.32
T_6 Pendimethalin´@1.750kg/ha(pre emergence) + Quizalofop-ethyl @ 1 kg/ha (post-emergence)	59022.69	406.59	406590	347567.31	5.88
T_7 Oxyfluorfen @ 1 kg/ha (pre-emergence) + Quizalofop-ethyl @ 1 kg/ha (post-emergence)	60105.19	415.17	415170	355064.81	5.90
T_8 Two hand weeding at 25 and 45 DAT	68611.19	374.10	374100	305488.81	4.45
T_9 Black polythene mulch	74019.19	269.74	269740	195720.81	2.64
T_{10} Organic mulch with paddy straw @ 20 q/ha	59605.19	157.58	157580	97974.81	1.64

The cost of cultivation (□74,821.19/ha) and gross monetary returns (□4,55,050/ha) were significantly higher in weed free treatment, While B:C ratio 5.90(T_7) Oxyfluorfen @ 1 kg/ha (pre-emergence) + Quizalofop-ethyl @ 1 kg/ha (post-emergence).These findings are in close vicinity with those reported by Sinare *et al.* (2014) [8], Kalhapure and shete (2012) [4] and Vishnu *et al.* (2015) [9].

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