Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.2951

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **5 (4):** 2075-2080 (2017)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Effect of Weed and Fertilizer Management on Various Growth and Weed Parameters of Onion (*Allium cepa* L.) Var. Pusa Red

Tribhuvan Rai* and M. L. Meena

Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, (A Central University) Vidya-Vihar Rae Bareli Road, Lucknow, U.P. India, 226 025

*Corresponding Author E-mail: tribhuvan7939@gmail.com

Received: 8.05.2017 | Revised: 19.05.2017 | Accepted: 20.05.2017

ABSTRACT

A field experiment was conducted during Rabi session 2015-16 at Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow to study the effect of weed and fertilizer management on growth and weed parameters of Onion (Allium cepa L.). Experiment was conducted in randomized block design with 18 treatments and three replications. The treatment T_5 (Weed free) recorded significantly lowest weed density, dry weight of weed and higher weed control efficiency. All the growth attributes of onion at 30, 60 and 90 days after transplanting viz., Height of plant No of leave//plant, neck thickness, No. of days required for bulb formation, No. of days taken to maturity were recorded maximum in the treatment T_5 (Weed free).

Key words: *onion, weed management, fertilizer management, Pendimethalin, Oxyfluorfen, and Fluazipop-p-butyl*

INTRODUCTION

Onion (*Allium cepa* L.) is bulb vegetable crop grown in Rabi season and used in daily diet of people in the whole world. It becomes a major cash crop with higher market demand and price due to its culinary, dietary and medicinal values. There has been spectacular increase in area and production over last 25years in onion. However, productivity has remained almost static. The present level of productivity of onion of the country is very low as compared to major producers like USA, China, Netherlands and Korea Republic. Onion is a shallow rooted crop a fairly high concentration of nutrient should normally be maintained at the surface of the soil for its optimum growth and yield[1]. Weed infestation is the important constraint in onion seed production, which causes reduction in bulb and seed yield to the tune of 40 to 80%[3] and 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, frequent irrigation and fertilizer application allows for successive flushes of weeds in onion.

Cite this article: Rai, T. and Meena, M.L., Effect of Weed and Fertilizer Management on Various Growth and Weed Parameters of Onion (*Allium cepa* L.) Var. Pusa Red, *Int. J. Pure App. Biosci.* **5(4):** 2075-2080 (2017). doi: http://dx.doi.org/10.18782/2320-7051.2951

The conventional methods of weed control such as hoeing, weeding, *etc*. are laborious and very expensive. More over weeding during critical growth stages is very difficult due to increased cost of human labours and its scarce availability. Removal of weeds through hand weeding method is laborious, costly and time consuming. This situation makes it necessary to use herbicides for effective and timely control of weeds. Yield losses due to weeds infestation in onion were as high as 82.2%[9]. The importance of urea, triple super phosphate and murate of potas on the growth and yield of vegetable crops is well-known.

MATERIALS AND METHODS

The experiment was carried out during *Rabi* season at Babasaheb Bhimrao Ambedkar University, Lucknow, U.P. India, during 2015-16. The experimental site is located in the central part of the Uttar Pradesh and located at 26 ^{0} 56' north latitude and 82 ^{0} 52' east longitude at an elevation of 111 meters above the mean sea level. The soil of experimental field was saline with high Ph 8.5, electrical conductivity was 0.28, organic carbon 0.29 % and sodium exchangeable percentage less than 15. The onion variety used in the experiment was Pusa Red One month old seedlings of uniform growth were transplanted in evening hour at a spacing of 15x10 cm in flat beds. The gross and net plot size was 1.80 x1.00 m and 1.5×1.0 m. The treatment details were as follows:T_1- Pendimethalin @1.0 kg a.i/ha application before planting, T_2- Oxyfluorfen@0.250 kg a.i/ha pre-emergence,, T_3- Fluazipop-p-butyl@0.250 kg a.i/ha, T_4- Hand weeding,T_5- Weed free, T_6- Weedy check, T_7- Pendimethalin+HW,T_8- Oxyfluorfen+Weed free, T_9- Fluazipop-p-butyl+Weed check, T_{10}- Pendimethalin+75% RDF+HW,- T_{11}- Pendimethalin+100% RDF+HW, T_{12}- Pendimethalin+125% RDF+HW, T_{13}- Oxyfluorfen+75%RDF+WF, T-$_{14}$- Oxyfluorfen+100%RDF+WF, T_{15}- Oxyfluorfen+125%RDF+WF,T_{16}- Fluazipop-p-butyl +75%RDF+WC, T_{17}- Fluazipop-p butyl +100%RDF+WC, T_{18}- Fluazipop-p-butyl +125%RDF+WC, These treatment combinations were laid out in randomized block design with having three replications. The herbicides were applied by using hand operated knapsack sprayer fitted with a flat fan type Nozzle was used for spraying the herbicides. All herbicides were applied as per the treatment schedule. For hand weeding, depending upon the weed intensity, weeds were removed manually. The fertilizer applications were done as per the treatment plan. The recommended plant protection measures were taken as and when required. Observations of vegetative parameters like plant height (cm),, No of leave//plant, Neck thickness(cm), No of days required for bulb formation, No of days taken to maturity and weed parameters like Weed density(no./m)^2, Weed control efficiency (%),fresh weight of weeds(g/m^2), Dry weight of weeds(g/m^2) were recorded at various intervals.

The weed count was recorded using 0.5 m x 0.5 m quadrate from four randomly fixed places in each plot and the weeds failing within the frames of the quadrate were counted, recorded and the mean values were expressed in number m^2 The density of monocot and dicot and the total weeds were recorded and expressed in number m^2. Weed control efficiency.

(WCE) was calculated as per the procedure.

$$\text{WCE (\%)} = \frac{\text{WDc} - \text{WDt}}{\text{WDc}} \text{x } 100$$

Where, WCE-weed control efficiency (per cent); WDc - weed biomass (gm^{-2}) in control plot and WDt --= Weed biomass (gm^{-2}) in treated plot. The collected data were statistically analyzed according to the methods suggested by Panse and Sukhatme[8].

RESULTS AND DISCUSSION

Effect on crop growth:

The data presented in Tables 1 revealed that all the vegetative parameters of onion significant variations among the treatments. Among the following treatments, the treatment T_5 (weed free) exhibited the better results in terms of plant height (cm) at 30 DAT (26.29), at 60 DAT (37.56) and at 90 DAP (51.43), No. of leaves/plant at 30, 60 and 90 DAT were 2.97, 5.94 and 6.94 respectively. Neck thickness (cm) at the time of maturity (8.10), No. of days required for bulb formation (65.15) and No. of days taken to maturity (118.00), followed by the treatment T_{12} (pendimethalin+125% RDF+HW) for plant height (cm) at 30 DAT (26.10), at 60 DAT (37.06) and at 90 DAP (51.12), No. of leaves/plant at 30, 60 and 90 DAT were 2.93, 5.83 and 6.90 respectively. Neck thickness (cm) at the time of maturity (7.84), No. of days required for bulb formation (65.89) and No. of days taken to maturity (120.00). The increase in plant height and no. of leaves per plant and other vegetative characters could be attributed to higher availability of nutrients, particularly nitrogen and maximum utilization of sun light by onion due to minimum competition from weed as a result of actions of pendimethaline[4]. Similar results were reported by Kathireson *et al*[5].

Effect on weeds:

The prominent weed species in the experimental plot were: *Chenopodium album, Portulaca oleracea, Euphorbia* spp., *Cynodon dactylon, Parthenium hysterophorous, Cyperus rotundas* and *Amaranths viridis*. All treatments caused significant reduction in total weed density and dry weight of weeds as compared to T_6-weedy check control. All treatments caused significant reduction in dry matter of weeds as compared to T_6-weedy check control (Table 2). It was significantly observed under that, the T_5 (weed free) shows the superiority amongst all the treatments. The lowest fresh weight of monocot weeds (g/m^2) at 30, 60 and 90 DAT was 31.52, 109.53 and 78.15 respectively was recorded in the treatment T_5 followed by Treatment T_{12} (pendimethalin+125% RDF+HW) at 30, 60 and 90 DAT was 35.32, 113.36 and 81.11. Highest fresh weight of monocot weeds (g/m^2 was observed in treatment T_6 (weedy check) and the lowest fresh weight of dicot weeds(g/m^2) at 30,60 and 90 DAT was observed 11.59, 33.47 and 55.45 in the treatment T_5 followed by treatment pendimethalin+125% RDF+HW at 30,60 and 90 DAT was 11.43, 34.03 and 59.73. Highest fresh weigh of dicot weeds (g/m^2) was observed in treatment weedy check. The lowest dry matter of weeds ($40.63g/m^2$) was recorded in T_5, followed by T_{12} (41.03). Khalid Mahmood *et.al*[6]. (2006) and Chandrika *et al*[2]., also reported similar results from their studies. The lowest weed density of monocot and dicot weeds recorded at 30, 60 and 90 DAT was shown in treatment T_5, which was 0.00. The highest weed control efficiency was observed under T_5 (63.81) followed by the treatment T_{12} (63.46). Similar observations were also made by Kolhe[7] and Warade *et al*[10].

Table 1: Effect of weed and fertilizer management on vegetative growth parameters of onion (*Allium cepa* L. var. Pusa Red

TREATMENTS	PLANT HEIGHT (CM)			NO. OF LEAVES			NECK THICKNESS (CM)	No. Of days required for bulb formation	No. Of days taken to maturity
	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP			
Pendimethalin @1.0 kg a.i/ha(PE)	19.20	30.11	44.31	2.54	4.50	5.60	6.09	75.96	135.00
Oxyfluorfen@0.250 kg a.i/ha(POE)	18.72	29.86	43.77	2.50	4.43	5.47	5.16	77.50	136.00
Fluazipop-p-butyl@0.250kg a.i/ha(POE)	17.53	28.33	42.29	2.47	4.26	5.28	4.93	76.89	138.00
Hand weeding	17.07	27.19	41.03	2.42	4.14	5.08	4.54	77.81	139.00
Weed free	26.29	37.56	51.43	2.97	5.94	6.94	8.10	65.15	118.00
Weedy check	16.19	26.30	39.84	2.11	3.86	4.41	4.16	80.66	142.00
Pendimethalin+HW	19.81	30.72	44.89	2.58	4.76	5.76	6.18	75.31	133.00
Oxyfluorfen+Weed free	20.59	31.69	45.85	2.61	4.79	5.84	6.22	73.49	132.00
Fluazipop-p-butyl+Weed check	16.63	26.97	40.56	2.29	4.04	4.95	4.26	78.84	140.00
Pendimethalin+75% RDF+HW	24.36	35.64	49.97	2.87	5.61	6.68	7.50	67.19	122.00
Pendimethalin+100% RDF+HW	25.76	36.49	51.12	2.91	5.75	6.77	7.65	66.78	121.00
Pendimethalin+125% RDF+HW	26.10	37.06	51.12	2.93	5.83	6.90	7.84	65.89	120.00
Oxyfluorfen+75%RDF+WF	22.92	34.50	47.76	2.75	5.22	6.31	7.14	70.25	126.00
Oxyfluorfen+100%RDF+WF	23.52	34.68	48.41	2.78	5.32	6.42	7.30	69.34	124.00
Oxyfluorfen+125%RDF+WF	24.11	35.05	49.32	2.81	5.49	5.88	7.43	68.65	123.00
Fluazipop-p-butyl +75%RDF+WC	21.05	32.16	46.08	2.64	4.94	5.94	6.46	73.49	131.00
Fluazipop-p-butyl +100%RDF+WC	21.67	32.81	46.68	2.67	5.04	6.10	6.56	72.86	129.00
Fluazipop-p-butyl +125%RDF+WC	22.14	33.06	47.21	2.71	5.13	6.17	6.58	71.38	128.00
CD(0.05)	2.312	2.809	2.815	0.044	0.136	0.253	1.841	2.444	2.320
SE(m)±	0.801	0.973	0.975	0.015	0.047	0.088	0.638	0.847	0.804

Table 2: Weed growth and weed control efficiency as influenced by weed management and fertilizer

TREATMENTS	Weed Density (no./m)^2						Fresh Weight of weeds(g/m^2)						Dry weight of weeds(g/m^2)	Weed control efficiency (%)
	30DAT		60DAT		90DAT		30DAT		60DAT		90DAT			
	M	D	M	D	M	D	M	D	M	D	M	D		
Pendimethalin @1.0 kg a.i/ha(PE)	91.31	3.51	170.69	6.3	241.59	11.97	71.94	24.44	139.81	44.59	184.06	85.20	93.87	17.00
Oxyfluorfen@0.250 kg a.i/ha(POE)	93.36	4.53	175.86	6.87	244.06	13.07	74.87	27.23	140.91	46.97	190.15	87.59	96.97	13.64
Fluazipop-p-butyl@0.250kg a.i/ha(POE)	95.22	5.84	179.48	7.39	246.58	14.55	76.85	27.25	144.26	48.48	198.33	90.37	101.14	9.58
Hand weeding	96.26	6.63	181.87	8.84	247.64	15.32	80.33	29.28	144.71	50.78	206.42	90.31	105.27	6.25
Weed free	0.00	0.00	0.00	0.00	0.000	0.00	31.52	11.59	109.53	33.47	78.15	55.45	40.63	63.81
Weedy check	105.4	10.27	188.84	12.34	252.50	17.34	86.24	31.91	148.72	56.11	220.18	94.06	112.29	0.00
Pendimethalin+HW	88.923	3.61	167.19	5.950	240.29	12.32	65.18	23.45	134.80	42.36	167.94	84.32	90.01	19.84
Oxyfluorfen+Weed free	86.70	3.06	163.38	5.03	239.117	10.94	62.12	22.96	134.67	40.91	167.94	79.92	85.64	22.84
Fluazipop-p-butyl+Weed check	98.70	9.49	184.34	12.37	249.07	15.43	82.86	32.09	147.95	52.35	209.46	92.25	106.82	4.87
Pendimethalin+75% RDF+HW	62.11	2.333	130.44	2.167	221.44	6.83	38.03	12.43	117.09	30.43	103.20	63.34	52.63	53.13
Pendimethalin+100% RDF+HW	59.39	1.987	127.06	2.787	221.06	6.48	37.02	12.42	117.67	39.45	85.26	61.17	42.63	62.03
Pendimethalin+125% RDF+HW	57.36	1.697	122.36	1.897	220.36	5.23	35.32	11.43	113.36	34.03	81.11	59.73	41.03	63.46
Oxyfluorfen+75%RDF+WF	78.65	2.843	144.98	2.920	227.65	9.12	48.49	14.43	126.18	35.57	135.07	70.59	68.88	38.65
Oxyfluorfen+100%RDF+WF	70.45	2.490	139.81	2.657	225.48	8.52	45.30	13.66	122.02	34.09	115.68	66.99	58.99	47.46
Oxyfluorfen+125%RDF+WF	63.95	2.693	133.95	2.757	223.29	7.75	41.72	12.62	122.91	32.36	107.26	66.64	54.70	51.53
Fluazipop-p-butyl +75%RDF+WC	84.53	3.263	158.06	4.917	236.67	11.39	58.36	19.40	131.58	38.56	161.03	79.78	82.12	28.50
Fluazipop-p-butyl +100%RDF+WC	82.46	2.470	153.69	3.903	234.69	10.23	55.91	18.35	131.03	36.52	152.03	75.14	77.53	30.95
Fluazipop-p-butyl +125%RDF+WC	81.70	2.527	149.87	3.760	233.87	9.77	51.67	16.74	127.74	38.78	146.03	71.38	74.47	33.68
CD(0.05)	2.572	1.204	2.798	1.149	3.408	0.999	2.658	1.268	2.381	2.142	3.175	2.234	3.103	4.861
SE(m)±	0.891	0.417	0.969	0.398	1.181	0.346	0.921	0.439	0.825	0.742	1.100	0.774	1.075	1.684

REFERENCES

1. Anonymous., FAO information site, *http: www.faostat.org.in.* (2012).
2. Chandrika, V.D., Reddy, Srinivasulu., Sagar, K.G. and Reddy, G. Prabhakara., Influence of graded levels of nutrients, time of N application and weed management practices on weed dynamics, yield attributes and bulb yield of onion (*Allium cepa* L.). *Indian Journal of Weed Science*, **41(1&2):** 80–89 (2009).
3. Channapagoudar, B.B. and Biradar, N.R., Physiological studies on weed control efficiency in direct sown onion. *Karnataka Journal of Agricultural Science* **20(2):** 375-376 (2007).
4. Jursík, M., Andr, J., Holec, J. and Soukup, J., Efficacy and selectivity of post-emergent application of flumioxazin and oxyfluorfen in sunflower. *Plant Soil Environ.,* **57(11):** 532-539 (2011).
5. Kathereson, R.M., Ghanavel, I., Jayakan, U.V., Arulchezlian, M.P., Anbhazhagon, R., and Pandmapriya, P., Bioefficiency and phytotoxicity of oxadiargyl in onion (Allium cepa var aggregatum). *Indian. J. Weed Sci*.**, 36(3&4):** 236-238. (2004).
6. Khokhar, Khalid. Mahmood., Mahmood, Tariq., Choudhary, Muhammad. Shakeet., M, Farooq., Evaluation of integrated weed management practices for onion in Pakistan. *Crop Protection*, **25:** 968–972 (2006).
7. Kolhe, S.S., Integrated weed management in onion (*Allium cepa* L.). *Indian Journal of Weed Science*, **33(1&2):** 26–29 (2001).
8. Panse, V.G. and Sukhatme, P.V., *Statistical Methods for Agricultural Workers.* Second edition, ICAR, New Delhi. (1995).
9. Tewari, A.N., Tiwari, S.N., Rathi, P.P.S., Shing, B. and Tripthi, A.K., Studies on crop-weed competition in kharif onion *(Allium cepa L.). Indian J. of Weed Sci*., **35(1&2):** 156-158 (2003).
10. Warade, A.D., Gonge, V.S., Jogdande, N.D., Ingole, P.G. and Karunakar, A.P., Integrated weed management in onion. *Indian Journal of Weed Science*, **38(1&2):** 92–95 (2006).