Assessment of different weedicides for Controlling weeds in Rabi onion

Assessing the Efficacy of Different Weedicides for ControllingWeeds in Rabi Onion (*Allium cepa* L)Farms;……then write the location of the farms including country to make the topic better.

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Abstract:

An attempt was made to find out the appropriate weed management practices for weed control in onion which is practically effective and economically feasible for farmers.Onions are slow-growing, shallow-rooted crops that can suffer severe yield loss from weed competition. Their narrow, upright leaves and non-branching habit do not compete well with weeds. In addition, their long growing season, frequent irrigation water and fertilizer application allows for successive flushes of weeds.The experiment was conducted at the farmers' field of Saharsa district, Bihar as 'On Farm Trial' mode for two years during 2017 and 2018 in Rabi season. The best treatment in terms of net return was Technology option-III, which gave the highest net return up to Rs 275420 q/ha. Benefit cost ratio varied significantly among the treatments. The highest benefit cost ratio (2.92) was found in Technology option-III which was statistically similar to Technology option-II (2.66).

Comment [M1]: Abstract should summarize everything in the research (In brief).
1.Title of the research
2.Objectives
3.Methodology
4.Results/Major Findings
5.Conclusion and Recommendation

Keywords: weed management, irrigation, fertilizer, Rabi season

INTRODUCTION

Onion (*Allium cepa* L.) is popularly known as "*Queenof kitchen*" because of its characteristic flavour. India is thesecond largest producer of onion in the world, next to China.InIndia, it is being grown on an area of 1.28 m/ha with a production of average 23.26 mt and the productivity is 18.1tonnes per hectare which is quite low (Anonymous, 2018).It is mainly used for cuisine and culinary purpose and also preventing coronary heart diseases and other aliments (Sanghaet *al.*, 2003). Onions are slow-growing, shallow-rooted crops that can suffer severe yield loss from weed competition. Their narrow, upright leaves and non-branching habit, do not compete well with weeds. In addition, their long growing season, frequent irrigation water and fertilizer application allows for successive flushes of weeds. Due to this type of growing habit, onion crop cannot compete well with weeds; yield loss due to weed infestation in onion has been recorded to the tune of 40 to 80% (Channapagoudaret *al.*, 2007 and Urraiya and Jha, 2017). Singh *et al.* (2016) also reported un-controlled weed

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growth reduces the bulb yield up to 40-80% depending upon the nature of intensity and duration of weed competition in onion field.

In the last few decades different herbicides were used alone or in combination to eliminate the weeds but their efficiency differs because of their narrow spectrum of weed control (Main*et al.*, 2007). Severe labour crisis makes weed control very difficult at the critical period and causing huge yield gap. The conventional methods of weed control (hoeing and weeding) are laborious, expensive and insufficient. Hence, an attempt was made to find out the appropriate weed management practices for weed control in onion which is practically effective and economically feasible for farmers.

MATERIALS AND METHODS

The experiment was conducted at the farmers' field of Saharsa district, Bihar as 'On Farm Trial' mode for two years during 2017 and 2018 in *Rabi* season. The planting was done during last week of October and the variety *Nasik-53*was used for this experiment. A Randomized Block Design (RBD) was used with three replications. The soil being clayey loam in texture, it was ploughed by tractor and then harrowed. The plot size was 3mx3m and the plants being planted at a distance of 15cmx10cm. NPK were applied at recommended rates just before transplanting and half of the nitrogen was applied after four weeks of transplanting. The crop was harvested during last week of April. The detail of technologies assessment/refinement, farming situation, area of intervention and technology option was presented in Table-1.

Comment [M3]: Provide figure and reference

Comment [M4]: Provide general information about the study Area.
1.Location
2.Soil
3.Weather and Climate
4.Rainfall
(They above have greater influence on the onions, the weed and the weedicides used)
State clearly the methods of data collection, types of data collected, data analysis as well as the software used in the analysis

Your methodology lacks references. Provide where necessary

Table-1 Technology option assessed during Rabi 2017 and 2018

Problem area	**Important cause**	**Production system**	**Micro farming situation**
Low productivity of Onion	High infestation of Weeds	Rice- Onion	Irrigated medium land with clay to sandy clay loam soil
Intervention plan			
Farmers' practice-I	Hand Weeding (HW)at 30 DAS		
Technology option-II	Pendimethalin @ 3ml/l as pre-emergence followed by Oxyfluorfen @ 1ml/l within 30-32 days		
Technology option-III	Pendimethalin @ 3ml/l as pre-emergence followed by Imazathapyr @ 1.2ml/l as post-emergence at 45 DAT		

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Table must have only three lines.

RESULTS AND DISCUSSION

Growth and Yield Parameters

All two weed management treatments weresuperior over farmers plot in respect of all growth andyield attributes and also the bulb yield (Table 2).The highest growth attributes (plant height, neckthickness) and yield attributes (polar andequatorial diameter and weight of bulb) andbulb yield were observed in Technology option-III.However,Technology option-IIwas at second place inrespect of all these attributes. Whereas, thelowest all growth and yield attributes and bulbyield were reported under farmers plot (withouthand weeding and chemical herbicides).It might be due to less weed crop competitionthroughout crop growth period by chemical weeding i.e., in Technology option-III,which in turn maintain the soilfertility status by way of removing less plantnutrients through weeds and ultimately havefavourable effect on growth parameters and yieldattributes. These findings are in close proximitywith the reports of Bhartia *et al*.(2011); Kalhapure *et al*.(2013);Gandolkar *et al*.(2015) and Kumar *et al*.(2014) who workedwith different crops.Increased Crop growth and bulb weight in Technology option-IIIwas favorable environment receivedto the Crop to express better plant growth. Thisincreased in Crop growth was due to less Cropweed Completion at the earlier stage of Cropgrowth.

Crop Yield

Among all the treatments, the highest bulb yield(268 q/ha) was obtained in Technology option-III*i.e.*Pendimethalin @ 3ml/l as pre-emergence followed by Imazathapyr @ 1.2ml/l as post-emergence at 45 DATfollowed by Technology option-II*i.e.*Pendimethalin @ 3ml/l as pre-emergence followed by Oxyfluorfen @ 1ml/l within 30-32 days. Thelowest bulb yield of 182 q/ha was observed in thefarmer's plots. Combinations of herbicides treatedplots fetched better result due to the efficientweed control which provided an opportunity forthe crop to utilize the available resourcesefficiently to produce good yield. The lowest yield(182 q/ha) in farmers plot may be due to weedcompetition. Thus, reducing availability ofmoisture, light and nutrients to the crop resultingloss of yield in theweeded plot. This supportsthe findings ofVerma and Singh (1996)in onion.Weed free plot reduced the competition from theweeds to a greater extent and thus helped infaster growth and development of onion bulbcrop, resulting in obtaining higher values of allyield attributing

characters. The findings are inclosely vicinity of those reported by manyresearchers Warade*et al*. (2006)and Saraf (2007) with respect to onionyield.

Dry Weight of Weeds

The significant effect on total dry weight of weeds(Table 3) was found due to different herbicidestreatments. The maximum dry weight (22.8g) was foundin Farmers' practice-I. The lowest dry weight(12.7) however, was found in Technology option-III. The dry weight of weeds may be dueto the increased weed population and continuousgrowth and may also be due to the higheramount of nutrient uptake(Patel*et al.*, 2012).The variability in weed population between thedifferent treatments could be attributed todifferences in the spectrum of weeds presentand differences in the spectrum of control byeach herbicide. These results agreed with thoseof Ghaffoor, 2004 and Khokhar*et al*., 2006.

Effect on Economic Returns

However, the best treatment in terms of net return was Technology option-III, which gave the highest net return up to Rs 275420 q/ha. Benefit cost ratio variedsignificantly among the treatments. The highest benefit cost ratio (2.92) was found in Technology option-III which was statistically similar to Technology option-II (2.66). On the other hand, the lowest benefit cost ratio (1.18) per hectare was obtained from farmer's plot. Technology option-IIIproduced the highest benefit cost ratio because weed free plot reduced the competition from theweeds to a greater extent and thus helped infaster growth and development of onion bulbcrop, resulting in obtaining higher values of allyield attributing characters.The results regarding gain of highest monetaryreturns and cost benefit ratio with integratedweed management practices are supported withthe results ofNandal and Singh(2002) and Pugalendhi *et al.* (2011) who have studied theeconomic returns parameters in INM in onioncrop under various climatic conditions.

CONCLUSION

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On the basis of two years data, it may concludethat application of Pendimethalin @ 3ml/l as pre-emergence followed by Imazathapyr @ 1.2ml/l as post-emergence at 45 DAT gave significantly higher plant height,bulb yield, net return and B:C ratio as compared to other treatments tested and significantly reduced theweed count and weed dry matter in onion crop is the best option for chemicalweed control in onion crop to gain desirableyields.

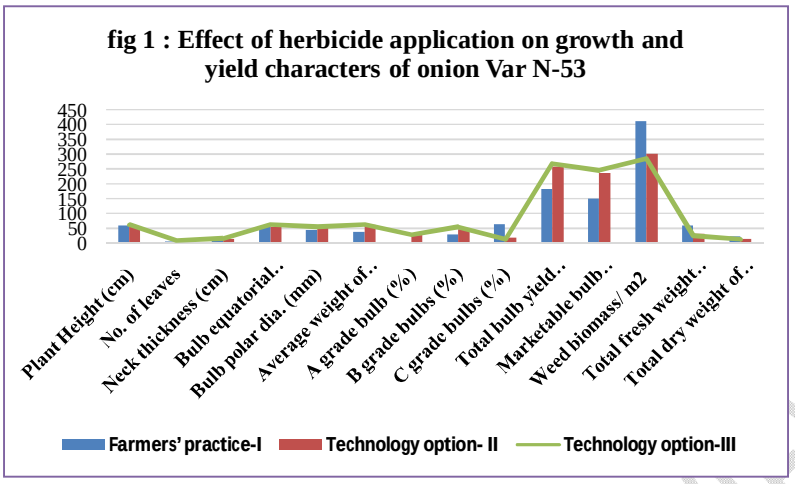
fig 1 : Effect of herbicide application on growth and yield characters of onion Var N-53
450
400
350
300
250
200
150
100
50
0
Plant Height (cm)
No. of leaves
Neck thickness (cm)
Bulb equatorial..
Bulb polar dia. (mm)
Average weight of..
A grade bulb (%)
B grade bulbs (%)
C grade bulbs (%)
Total bulb yield..
Marketable bulb..
Weed biomass/ m2
Total fresh weight..
Total dry weight of..
Farmers' practice-I
Technology option- II
Technology option-III

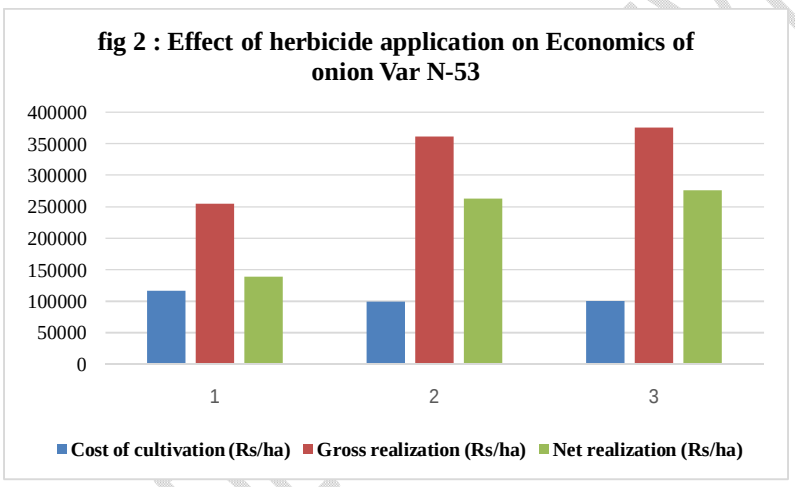
fig 2 : Effect of herbicide application on Economics of onion Var N-53
400000
350000
300000
250000
200000
150000
100000
50000
0
1
2
3
Cost of cultivation (Rs/ha)
Gross realization (Rs/ha)
Net realization (Rs/ha)

Table-2 Effect of herbicide application on growth and yield characters of onion Var N-53

Treatment	Plant Height (cm)	No. of leaves	Neck thickness (cm)	Bulb equatorial dia. (mm)	Bulb polar dia. (mm)	Average weight of bulb (g)	A grade bulb (%)	B grade bulbs (%)	C grade bulbs (%)	Total bulb yield (q/ha)	Marketable bulb yield (q/ha)
Farmers' practice-I	60.4	7.3	12.4	55.6	45.0	38.4	3.60	30.5	64.2	182	150
Technology option- II	58.8	9.1	13.6	56.7	50.9	61.2	27.4	47.9	18.7	258	238
Technology option-III	61.8	9.1	15.3	62.5	55.5	62.5	28.0	54.3	13.1	268	246
SEm ±	0.88	0.76	0.55	0.71	0.83	0.58	1.18	0.59	0.41	0.77	1.06
CD at 5%	2.08	1.80	1.30	1.67	1.97	1.36	2.80	1.38	0.98	1.83	2.50
CV (%)	1.03	6.33	2.82	0.86	1.17	0.75	2.46	0.94	0.91	0.23	0.20

Table 3 Effect of herbicide application on weed parameters and Economics of onion Var N-53

Treatment	Weed biomass/m^2	Total fresh weight of weeds (g)	Total dry weight of weeds (g)	Cost of cultivation (Rs/ha)	Gross realization (Rs/ha)	Net realization	B:C ratio
Farmers' practice-I	411.0	60.1	22.8	116390	254800	138410	1.18
Technology option-II	300.4	31.0	13.8	98808	361200	262392	2.66
Technology option-III	285.7	24.5	12.7	99780	375200	275420	2.92
SEm ±	0.69	0.63	0.35	-	-	-	-
CD at 5%	1.62	1.50	0.83	-	-	-	-
CV (%)	0.08	1.16	1.51	-	-	-	-

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Comment [M7]: Your tables should be with their discussions

Reference

1. Anonymous. (2018). FAO information site, *http: www.faostat.org.in*.

Bhartia, S., Rao,A. S.andKumari, S.(2011).Effectof weed management practices on weedcontrol and yield of onion (*Allium cepa L*) invertisols. *J. Res. Angrau*.2011; **37**(1-2):10-13.

Channapagoudar, B. B. and Biradar, N. R. (2007).Physiological studies on weed control efficiency in direct sown onion. *Karnataka J. of Agril. Sci*.**20**(2):375-376.

Gandolkar, K., Halikatti, S. I., Patel, P. S. and Pattarand, P. L. (2015).Effect of sequentialapplication of herbicides for weedmanagement in drill sown onion (*Alliumcepa L*) Under Rainfed Condition.*Bioinfolet*-Aquarterly Journal of LifeSciences.**12**(13):748-755.

Ghaffoor, A. (2004). Integrated weed managementin different varieties of onion (*Allium cepaL.) Pak J. of weed Sci.Res*.**10**:55-62.

Kalhapure, A. H., Ahete, B. T. andBodake, P. S.(2013). Integrated weed management in onion(*Allium cepa L.). J. Agron*.**58**(3):408-411.

Khokhar, K. M., Mahmood, T., Shakeel, M. andAhmad, I. (2006). Growing onion in Pakistan.*Pak. Agri*. **1**(1):11-16.

Kumar, U., Prasad, B. and Chandra, G. (2014). Effect ofdifferent herbicides on growth, yield andweed flora of onion (*Allium cepa L*).*J. of Hill Agri*.**5**(2):207-210.

Main, C. L., Michael, A. J. and Murdock, E. C. (2007). Weed response and tolerance of enhanced glyphosate-resistant cotton to glyphosate. J. of Cotton Sci. **11**(2):104-109.

Nandal, T. R. and Singh, R. (2002). Integratedweed management in onion (*Allium cepaL*) under Himachal Pradesh conditions.*Ind. J. Weed Sci*.**34**(1&2):72-75.

Patel, T. U., Patel, C. L., Patel, D. D., Thakur, J. D.,Arvadia, M. K. and Vaidya, H. B. (2012). Performance ofonion under weed and fertilizermanagement. *Ind. J. of Weed Sci*.**44**(3):151-158.

Pugalendhi, L., Sathiyamurty, Y. A., Sumathe,T. and Thangamani, C. (2011). Weed managementstudies in onion. Nat. Sympo. on Alliums:Current Scenario and Emerging trends, 12-14th March, Pune, 257.

2. Sangha, J. K. andBariag, P. (2003). Efficacy of multiple dietary therapies in reducing risk factor for coroner heart disease. *J. of Human Ecology*.**14**:33-36.

Saraf, R. K. (2007). Herbicidal weed control in KharifOnion. *Asian J. of Horti.Sci.* **2**(1):1-5.

Singh, S. K., Shyam, R., Chaudhary, S. and Yadav, L. M. (2016). Weed management in onion. *Ind. J. of Weed Sci*.**48**(2):199-201.

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Urraiya, P. and Jha, M. K. (2017). Weed management studies in kharif onion (*Allium cepa* L.) on yield attributes. *J.Pharmaco. and Phytochem.***6**(6): 14-16.

Verma, S. K. and Singh, T. (1996). Weed control in Kharifonion (*Allium cepa L.*). *Ind. J. Weed Sci.***28**(1-2):48-51.

Warade, A. D., Gorg, V. S., Jogandle, N. D.,Ingole, P. G. and Karunakar, A. P. (2006). Integrated weedmanagement in onion. *Ind. J. of Weed Sci.***38**(1-2):9-95.