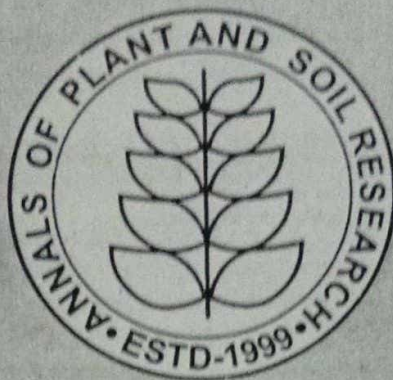


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<b>SWATHI KONENI, SUNANDA MOKA, V.S. SHINDE, G.M. KOTE</b> Nutrient uptake, quality and economics of green gram ( <i>vigna radiata</i> L.) As influenced by phosphorus management	241
<b>TANUMAY MANDAL, V. K. SINGH, CHANDRA BHUSHAN AND AMRENDRA KUMAR</b> Weed dynamics, nutrient removal and yield of urdbean ( <i>vigna mungo</i> L. Hepper) as influenced by weed management practices under tarai Conditions of uttarakhand	245
<b>UMESH BABU, N. PRATAP, RAJ SHEKHAR, R.P. SINGH AND L.K. GANGWAR</b> Genetic analysis for yield components and oil content in Indian Mustard [ <i>brassica juncea</i> (L.) Czern & coss]	250
<b>V.PAVANKALYAN AND N.VASUDEV</b> Cropping intensity and cropping pattern in tribal agriculture (itda Area) in andrapradesh	255
<b>VIPIN GUPTA, MRITUNJAY TRIPATHI AND N.A.KHANB</b> Characterization of cysteine protease inhibitor from <i>artocarpus Heterophyllus</i> and cry protein from <i>bt</i> ( <i>bacillus thuringiensis</i> ) for Antimetabolic activity of <i>scirpophage Incertulas</i> (yellow stem Borer)	258
<b>Y. LATIKA DEVI AND K SUHASINI</b> Resource use efficiency of groundnut production in Andhra Pradesh	263
<b>S.M.A. ZAIDI, M.K SINGH AND S.P. SINGH</b> A study of phenotypic, genotypic correlation coefficient and its Contributing traits of variability, heritability and expected genetic Advance in bottle gourd [ <i>lagenaria siceraria</i> (molina)]	266
<b>S. ALAGAPPAN, R,VENKITASWAMY AND G. MARIAPPAN</b> Impact of different sources of organic manures in comparison with Rdf and inm on growth and yield of rice	269
<b>V. AMIRTHA LINGAM, K.ANGAPPAN, E.G.EBENEZAR, S.RAJESH, S.NAKEERAN</b> A study on native isolates of <i>Trichoderma</i> spp. From southern districts of tamilnadu	273
<b>T.ANANTHI AND M. MOHAMED AMANULLAH</b> Influence of mycorrhizal inoculation and fertilizer levels on Physiological growth parameters and yield of hybrid maize	278
<b>M.DHIVYA AND R. SANANKARANARAYANAN</b> Effect of different growing environments on the growth of Selected cacti under tropical condition	283
<b>D.DHIVYAPRIYA, V. KARPAGAM AND R.KALAIYARASI</b> Morphological characterization of thermo sensitive genic male Sterile lines for floral traits in rice	286
<b>S.A. JAYAPRAKASH, S. MOHAN AND M. KANNAN</b> Evaluation of seed treating and foliar insecticides against sucking Pests of bollgard ii <i>bt</i> cotton	290
<b>N. KALIESWARI, T. ANAND AND D. ALICE</b> In vitro screening of effective pgpr (fluorescent pseudomonad) Strains against root rot and wilt of cotton	294
<b>KARTHIKADEVI.M AND S.GUNASEKARAN</b> Evaluation Of Polyphenolic Compounds In Fruit Wines	298
<b>M. DHANANIVETHA, M. MOHAMED AMANULLAH AND P. MURALI ARTHANARI</b> Effect of weed management methods on weed control and Productivity of onion	301
<b>R.MAHENDRAN, P.VEERABADHIRAN, S.ROBIN AND M.RAVEENDRAN</b> Genetic variability in rice germplasm lines for high temperature Tolerance related traits	304
<b>M. MOHANA KEERTHI, R. BABU, M. JOSEPH AND R. AMUTHA</b> Combined effect of plant geometry and nutrient management on Growth parameters and yield of irrigated greengram	308
<b>PARTHASARATHY, S., MOHAMMAD FAISAL, P., PRABAKAR., K., THIRIBHUVANAMALA, G. AND RAJALAKSHMI, J.</b> Profiling of antifungal compounds from <i>n</i> -hexane extracts of Mango fruits against major post harvest pathogens	311
<b>K. JANCY RANI AND S. SUBRAMANIAN</b> Influence of temperature and moisture on the entomopathogenic Nematode <i>steinernematami</i>	317
<b>RAMACHANDRAN. A AND VENKATARAMAN. N.S</b> Evaluation of allelopathic impact of aqueous leaf extracts Of <i>tagetes erectus</i> on seed germination, seedling growth of <i>Parthenium hysterophorus</i>	321
<b>B.RAMYA, G.NALLATHAMBI AND S.GANESH RAM</b> Development of mutant population for low raffinose family Oligosaccharide content in blackgram ( <i>vigna mungo</i> (L.) Hepper)	325



## EFFECT OF WEED MANAGEMENT METHODS ON WEED CONTROL AND PRODUCTIVITY OF ONION

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### ABSTRACT

Field experiment was conducted at Agricultural Research Station, Bhavanisagar of Tamil Nadu Agricultural University, during rabi 2012-13 to evaluate bio-efficacy and phytotoxicity of quizalofop-ethyl (5% EC) for management of weeds in onion. The experiment was laid out in randomized block design and replicated thrice. The treatments comprised of twelve different weed management practices viz., early post-emergence application of new formulation of quizalofop-ethyl at 37.5, 50, 75 and 100 g a.i. ha<sup>-1</sup>, already registered early post-emergence herbicide quizalofop-ethyl (Targa super) at 37.5 and 50 g a.i. ha<sup>-1</sup>, pendimethalin 1.0 kg a.i. ha<sup>-1</sup> + hand weeding on 45 DAT, pendimethalin 1.0 kg a.i. ha<sup>-1</sup> + mechanical weeding on 45 DAT, oxyfluorfen 0.2 kg a.i. ha<sup>-1</sup> + hand weeding on 45 DAT, oxyfluorfen 0.2 kg a.i. ha<sup>-1</sup> + mechanical weeding on 45 DAT, hand weeding on 25 and 45 DAT and unweeded check. Application of new formulation of quizalofop-ethyl (5% EC) at 75 g a.i. ha<sup>-1</sup> can lower the weed density and dry weight during critical stage of the crop growth which in turn increase the bulb yield and net return in onion.

**Keywords:** Early post-emergence herbicide, quizalofop-ethyl, onion

### INTRODUCTION

Indian agricultural sector plays a crucial role in the economic development of the country. Cereals, pulses, oilseeds, fruits and vegetables are the major source of food materials. Among vegetables, onion occupies a prominent place and is cultivated commercially throughout tropical and subtropical belts of the world. The bulbous vegetable onion *Allium cepa* Var. *aggregatum* L. (2n=16) is the most important species of *Allium* group and is regarded as the single most important vegetable spices as it forms an indispensable part of many diets, both vegetarian and non-vegetarian. Onion is the most common item in every kitchen as vegetable, spice and condiment. It is also known as Queen of kitchen. Onion bulb is rich in minerals, especially calcium and phosphorus. It is a condiment crop, which is consumed usually as chopped or sliced or fresh in salads as well as used in dishes as spice (Baloch, 1994). Weeds play a major role in reducing the yield of the onion crop. Onion exhibits greater susceptibility to weed competition as compared to other crops due to its inherent characteristics such as their slow growth, small stature, shallow roots and lack of dense foliage (Ware and McCollum, 1975).

### MATERIALS AND METHODS

Field experiment was conducted at Agricultural Research Station, Bhavanisagar of Tamil Nadu Agricultural University, during rabi 2012-13. The experiment was laid out in randomized block design and replicated thrice. The treatments comprised of twelve different weed management practices viz., early post-emergence application of new formulation of quizalofop-ethyl at 37.5 (T<sub>1</sub>), 50 (T<sub>2</sub>), 75 (T<sub>3</sub>) and 100 (T<sub>4</sub>) g a.i. ha<sup>-1</sup>, already registered early post-emergence herbicide quizalofop-ethyl (Targa super) at 37.5 (T<sub>5</sub>) and 50 (T<sub>6</sub>) g a.i. ha<sup>-1</sup>, pendimethalin at 1.0 kg a.i. ha<sup>-1</sup> + Hand Weeding on 45 DAT (T<sub>7</sub>), pendimethalin at 1.0 kg a.i. ha<sup>-1</sup> + Mechanical Weeding on 45 DAT (T<sub>8</sub>), oxyfluorfen at 0.2 kg a.i. ha<sup>-1</sup> + Hand Weeding on 45 DAT (T<sub>9</sub>), oxyfluorfen at 0.2 kg a.i. ha<sup>-1</sup> + Mechanical Weeding on 45 DAT (T<sub>10</sub>).

Hand Weeding on 25 and 45 DAT (T<sub>11</sub>) and unweeded check (T<sub>12</sub>) were laid out in randomized block design with three replications. Onion variety Co (On) 5 was transplanted by raising nursery. The crop was fertilized with the recommended dose of 60:60:30 kg NPK ha<sup>-1</sup>.

### RESULT AND DISCUSSION

Predominant weed species observed in the experimental field are four species of grassy weeds namely *Brachiaria reptans*, *Chloris barbata*, *Digitaria bicornis*, *Echinochloa colonum* and six species of broad leaved weeds namely *Eclipta prostrata*, *Euphorbia hirta*, *Portulaca oleracea*, *Stachytarpheta jamaicensis*, *Trianthema portulacastrum* and *Tridax procumbens*. *Cyperus iria* was the only sedge weed found in the experimental field. Grassy weeds dominated the experimental field followed by broad leaved and sedge weeds throughout the crop growth. Similar findings were observed by Sarkar et al. (2005). Weed management treatments significantly affected weed density and weed dry weight at 40 DAP (Table 1). Lower weed density and weed dry weight was observed under hand weeding on 25 and 45 DAT (T<sub>11</sub>) which was comparable with early post-emergence application of new molecule of quizalofop-ethyl at 100 (T<sub>4</sub>) and 75 g a.i. ha<sup>-1</sup> (T<sub>3</sub>). After application of quizalofop-ethyl, injury symptoms began as chlorosis and susceptible weeds stopped growing at 3 to 5 days. Necrosis began after 5 days and the weeds death occurred at 7-10 days. Increasing the dose of herbicide also reduced the density of herbicide to a greater extent. Similar findings were noticed Rahman et al. (2011). Similar trend in use of different herbicides at higher concentration was found to be most effective in controlling weeds than their lower concentration by Chauhan et al. (1998). Higher weed density was recorded under unweeded control (T<sub>12</sub>) irrespective of all the stages of observation. Similar trend was noticed by Patel et al. (2011). Higher weed control efficiency was observed under hand weeded plots followed by quizalofop-ethyl at 100 and 75 g a.i. ha<sup>-1</sup>. Taller plants were observed under early post-emergence application of new molecule of quizalofop-ethyl at 75 g a.i. ha<sup>-1</sup> (T<sub>3</sub>) comparable with oxyfluorfen at 0.2 kg a.i. ha<sup>-1</sup> + hand weeding on 45 DAT (T<sub>9</sub>) and oxyfluorfen at 0.2 kg a.i. ha<sup>-1</sup> + mechanical weeding on 45 DAT



(T<sub>10</sub>). Better control of weeds resulting in favourable environment in the root zone resulting in absorption of more water and nutrients from soil. The results are in conformity with the findings of Raj et al. (2012). Least plant height was obtained under unweeded control because of the poor exposure to direct sunlight as a result of smothering effect of weeds. Similar finding was reported by Channappagoudar and Biradar (2007). Higher bulb weight and bulb yield (30.20 g and 13,055 kg ha<sup>-1</sup>) was obtained under early post-emergence application of new molecule of quizalofop-ethyl at 75 g a.i ha<sup>-1</sup> (T<sub>3</sub>) due to efficient control of weeds at critical stages resulting in least competition by weeds for nutrients providing

favourable environment for growth and development of onion leading to increase in yield. This finding derives support from Patel et al. (2011) who also reported similar findings.

### Conclusion

Application of new formulation of quizalofop-ethyl (5% EC) at 75 g a.i ha<sup>-1</sup> (T<sub>3</sub>) can lower the weed density and dry weight in grass dominated fields during critical stage of the crop growth which in turn increase the bulb yield and net return in onion.

Table 1. Effect of weed management methods on total weed density, weed dry weight and weed control efficiency at 40 DAT

Treatments			Total weed density (No/m <sup>2</sup> )	Total weed dry weight (g/ m <sup>2</sup> )	Weed control Efficiency (%)
T <sub>1</sub>	-	EPOE Quizalofop-ethyl 5% EC at 37.5 g a.i ha <sup>-1</sup>	10.85 (116.15)	12.76 (161.25)	75.64
T <sub>2</sub>	-	EPOE Quizalofop-ethyl 5% EC at 50 g a.i ha <sup>-1</sup>	9.85 (95.16)	11.99 (141.91)	78.56
T <sub>3</sub>	-	EPOE Quizalofop-ethyl 5% EC at 75 g a.i ha <sup>-1</sup>	8.44 (70.05)	10.40 (106.73)	83.87
T <sub>4</sub>	-	EPOE Quizalofop-ethyl 5% EC at 100 g a.i ha <sup>-1</sup>	8.14 (64.43)	10.02 (98.40)	85.13
T <sub>5</sub>	-	EPOE Quizalofop-ethyl 5% EC (TS) at 37.5 g a.i ha <sup>-1</sup>	10.93 (117.76)	12.36 (151.01)	75.67
T <sub>6</sub>	-	EPOE Quizalofop-ethyl 5% EC (TS) at 50 g a.i ha <sup>-1</sup>	9.90 (96.25)	11.19 (146.81)	77.82
T <sub>7</sub>	-	PE Pendimethalin at 1.0 kg a.i ha <sup>-1</sup> + HW on 45 DAT	9.31 (85.13)	13.13 (171.24)	74.13
T <sub>8</sub>	-	PE Oxyfluorfen at 0.2 kg a.i ha <sup>-1</sup> + HW on 45 DAT	9.07 (80.77)	12.75 (161.57)	75.59
T <sub>9</sub>	-	PE Pendimethalin at 1.0 kg a.i ha <sup>-1</sup> + MW on 45 DAT	9.39 (86.34)	13.02 (167.90)	74.63
T <sub>10</sub>	-	PE Oxyfluorfen at 0.2 kg a.i ha <sup>-1</sup> + MW on 45 DAT	9.01 (79.44)	12.73 (160.57)	75.74
T <sub>11</sub>	-	Hand weeding on 25 and 45 DAT	7.28 (51.07)	9.73 (92.94)	85.96
T <sub>12</sub>	-	Unweeded control	16.80 (280.97)	25.76 (661.83)	-
SEd			0.57	0.64	
CD (P=0.05)			1.19	1.34	

Figures in the paranthesis are original values TS -Targa Super HW -Hand Weeding MW -Mechanical Weeding



Table 2. Effect of weed management methods on plant height, bulb weight and bulb yield of onion

Treatments		Plant height (cm)	Bulb weight (g)	Bulb yield (kg ha <sup>-1</sup> )
T <sub>1</sub>	- EPOE Quizalofop-ethyl 5% EC at 37.5 g a.i ha <sup>-1</sup>	38.94	23.19	9704
T <sub>2</sub>	- EPOE Quizalofop-ethyl 5% EC at 50 g a.i ha <sup>-1</sup>	42.94	23.37	10388
T <sub>3</sub>	- EPOE Quizalofop-ethyl 5% EC at 75 g a.i ha <sup>-1</sup>	47.43	30.20	13055
T <sub>4</sub>	- EPOE Quizalofop-ethyl 5% EC at 100 g a.i ha <sup>-1</sup>	39.97	24.18	9972
T <sub>5</sub>	- EPOE Quizalofop-ethyl 5% EC (TS) at 37.5 g a.i ha <sup>-1</sup>	37.99	21.83	9633
T <sub>6</sub>	- EPOE Quizalofop-ethyl 5% EC (TS) at 50 g a.i ha <sup>-1</sup>	42.47	22.98	10355
T <sub>7</sub>	- PE Pendimethalin at 1.0 kg a.i ha <sup>-1</sup> + HW on 45 DAT	42.82	23.53	11197
T <sub>8</sub>	- PE Oxyfluorfen at 0.2 kg a.i ha <sup>-1</sup> + HW on 45 DAT	46.45	28.53	12858
T <sub>9</sub>	- PE Pendimethalin at 1.0 kg a.i ha <sup>-1</sup> + MW on 45 DAT	43.25	23.93	10707
T <sub>10</sub>	- PE Oxyfluorfen at 0.2 kg a.i ha <sup>-1</sup> + MW on 45 DAT	45.25	25.76	12681
T <sub>11</sub>	- Hand weeding on 25 and 45 DAT	43.81	25.12	11393
T <sub>12</sub>	- Unweeded control	32.47	9.12	4053
SEd		1.77	2.18	793
CD (P=0.05)		3.70	4.55	1657

TS -Targa Super      HW -Hand Weeding      MW -Mechanical Weeding

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