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Inter and Intra Row Spacing Effect on Thrips (*Thrips* spp.) Population in Onion (*Allium cepa*)-I

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Abstract: To evaluate the effect of row-to-row distance of onion plants on thrips population, an experiment was conducted in Quetta, Pakistan. Five line spacing (20, 25, 30, 35 and 40 cm) with constant 20 cm plant-to-plant distance were tested. An inverse relation was found between increased line spacing and thrips population. Maximum mean number of thrips (162.4 plant⁻¹) was observed on the plants cultivated in 20 cm apart rows with minimum yield (20310 kg ha⁻¹). Minimum mean number of thrips (96.20 and 98.55 plant⁻¹) was recorded from T₅ (40 cm RxR distance) and T₄ (35 cm RxR distance) with 20380 and 21250 kg ha⁻¹ yield, respectively. Optimum number of thrips (114.3 plant⁻¹) was recorded on plant cultivated in 30 cm apart lines with maximum yield (28250 kg ha⁻¹). 30 cm row-to-row distance with 20 cm plant-to-plant distance in onion is recommended as an Integrated Pest Management (IPM) tool to culturally control thrips in the crop.

Key words: Thrips, line spacing, onion, IPM, Balochistan, Pakistan

Introduction

Balochistan is the largest province of Pakistan having least area under cultivation (Malik and Ali, 2002). The province produces an average of 549.6 thousand ton onion each year (Anonymous, 1999-2000). There is an extensively demand of onion as condiment in Pakistan (Anonymous, 2001). It is a rich source of phosphorus, calcium and carbohydrates (Khokhar *et al.*, 2002a) and widely use as micro ingredient it relish different dishes (Khokhar *et al.*, 2002b).

Farmers of Balochistan are poor and mostly illiterate (Shah *et al.*, 2002), onion is their mainstay among horticultural crops (Hassan and Malik, 2001a). Thrips (Malik *et al.*, 2003) and weeds (Hassan and Malik, 2001b) are the main pests that damage the crop in Balochistan. Mostly pesticides are used as major weapon against the pest in the province (Malik *et al.*, 2002) which not only increases the cost of production (Malik *et al.*, 2003) but also is hazardous for the environment and mammals. Labor is cheap and easily available in the province thus manual crop management techniques are affordable by the farmer. To control the thrips, at minimum cost, cultural practices could easily be adopted. Use of chemicals (Roa and Kumaraswami, 1986; Srivastava and Gupta, 1993; Guha and Das, 1994; Hazara *et al.*, 1999), sticky traps (Ellis and Bradley, 1992, Anonymous, 1998), colored traps and mulches (Lu, 1990) were successfully used against thrips in onion. No work is reported to check the thrips infestation in the said crop by adopting different inter and

intra row spacing.

Keeping in view this study was designed to evaluated if the inter and intra row spacing affects on the population density of thrips in onion.

Materials and Methods

To evaluate the inter (row-to-row, R x R) and intra (plant-to-plant, P x P) row spacing effect on thrips population five treatments of R x R spacing (20, 25, 30, 35 and 40 cm) with constant 20 cm P x P distance in onion, an experiment was conducted at Quetta during 2001. Onion variety "Chiltan-89" was selected for the trail. The said variety was recommended as best suited for the region (Alizai, 2001) and is well popular among the farmer of the province (Malik *et al.*, 2003). Certified and treated seeds, of the said onion variety, were obtained from the Agronomy Section, Agriculture Research Institute (ARI), Sariab, Quetta. Plots of 5 x 8 (40 m²) equal sizes were laid out in Randomize Complete Block Design (RCBD) with Split Plots arrangement on a well-prepared land in four replication. Each Line Spacing replication had untreated and treated sets. Treated sets were sprayed with insecticides (Methamidophos, Pandophose 20EC) and Monocrotophos, Nuvacron) to keep the thrips population well under threshold level. Hazare *et al.* (1999) reported 6-10 thrips per onion plant as threshold level. Nursery for the seed-lings was raised and the seed-lings were transferred in the plots in the first last week of March. Weed crop completion affects the yield or plays a

possible role as alternate host for the (Roberts, 1973; Hassan and Malik, 2001a; 2001b, 2002). Nitrogen fertilizer affects on the selection in acceptance and suitability of host plant herbivores insects (Bentz *et al.*, 1995). To keep the thrips population unaffected by fertilizers and weeds, no fertilizers was applied in the untreated /treated plots during the experiment while hand weeding was done four times to keep the whole experimental area free of weeds thought out the season. The crop was irrigated 24 times by tube-well at different intervals. Date on thrips population were recorded weekly the five randomly selected plants from each plot, till the digging of the crop. Thrips population was kept under the threshold level through out the season in the treated plots. After digging, produce of each treated and untreated plots were measured and were compared for the response to thrips infestation to evaluate the effect of lin spacing on thrips population. Mythological data were obtained at Meteorological station, ARI, Quetta.

Data were analyzed by the Microcomputer Statistical Program for Experiments, Designs and Analysis (Russell, 1992). Pesticide treated and untreated plots were considered as main plots while Line Spacing as sub plots. Observation were recorded on thrips population and yield. Analysis of Variance (ANOVA) was constructed to test the significant differences between the variables. Least Significant Difference (LDS) test was applied to differentiate the means.

Results and Discussion

Mostly hot and dry weather was observed during the trial. Thrips appeared in the 2nd week of April. Significant differences in the thrips population were observed in different inter row spacing treatments and yield (Table 4) Table 1 reveals the mean total number of thrips per plant on all tested line spacing and yield obtained from untreated plots. Maximum number of thrips (162.4 plant⁻¹) was observed from T₁ (20 cm R x R distance) with least (20310 kg ha⁻¹) yield. Minimum mean number of thrips (96.20 and 98.55 plant⁻¹) was recorded from T₅ (40 cm R x R distance) and T₄ (35 cm R x R distance) with 20380 and kg ha⁻¹ yield, respectively.

Table 2 depicts mean total number of thrips per plant and yield in all treatment with control of thrips. Same trend was observed, as it was in untreated plots except the increase in yield. This increase in yield in treated plots (thrips free) proves the negative effect of thrips population on onion in untreated plots. The significant difference in population density of the pest, in all treatment, shows it's direct relation with line spacing. It is observed that thrips could damage the crop up to 20.76% (Table 3).

Table 1: Means total number of thrips per plant and yield in un-treated onion crop with different line spacing of onion at Quetta, Balochistan, during the season, 2001

Treatments	Line spacing (cm)	Thrips population (Un-treated)	Yield (kg ha ⁻¹)
T ₁	20	162.4a	20310c
T ₂	25	146.8b	25630b
T ₃	30	114.3c	28250a
T ₄	35	98.55d	21250c
T ₅	40	96.20d	20380c

Table 2: Means total number of thrips per plant and yield in treated onion crop with different line spacing of onion at Quetta, Balochistan, during the season, 2001

Treatments	Line spacing (cm)	Thrips population (treated)	Yield (kg ha ⁻¹)
T ₁	20	56.50a	25630c
T ₂	25	48.50b	30130b
T ₃	30	45.85c	32880a
T ₄	35	38.10d	24440c
T ₅	40	34.70e	24560c

Table 3: Percent inverse of onion yield in treated plots in all treatment of line spacing at Quetta, Balochistan, during the season, 2001

Treatments	Line spacing (cm)	Untreated yield (kg ha ⁻¹)	Treated yield (kg ha ⁻¹)	%Increase in yield
T ₁	20	20310	25630	20.76
T ₂	25	25630	30130	14.94
T ₃	30	28250	32880	14.08
T ₄	35	21250	24440	13.05
T ₅	40	20380	24560	17.02

Table 4: Means total overall thrips per plant and yield in onion crop with different line spacing of onion at Quetta, Balochistan, during the season, 2001

Treatments	Line spacing (cm)	Overall thrips population (Treated+ Untreated)	Overall yield (kg ha ⁻¹)
T ₁	20	109.5	22970c
T ₂	25	97.65b	27880b
T ₃	30	80.08c	30565a
T ₄	35	68.32d	22845c
T ₅	40	65.45e	22470c

*Lower case letters indicate significant difference down the column using the LSD test. LSD values for total thrips per plant and yield at significance level of 0.05 are 2.445 and 1758, respectively.

Over all position of thrips population and yield from all treatments of line spacing is explained in Table 4. Maximum yield (30565 kg ha⁻¹) was obtained from T₃ (30 cm lint-to-line spacing). Through the yield of the plots that had 25 cm inter row spacing is statistically not at par to 30 cm line spacing but is almost same (27880 kg ha⁻¹). Regarding thrips population the said two treatment got optimum number of thrips per plant. Since the farmers are much interested in the out come thus 30 cm inter row spacing with 20 cm plant-to-plant distance is recommended for commercial farming of onion. The said R x R and P x P distance may also be used as effective IPM too in for control of the said pest in onion.

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References

- Anonymous, 1998. Pink thrips, University of California, Davis, CA, USA, B.U.G.S. Flyer winter, pp: 3.
- Anonymous, 1999-2000. Agriculture Statistics Balochistan, Statistical Wing, Directorate General Agriculture (Extension) Balochistan, Quetta, pp: 43.
- Anonymous, 2001. Fruit, vegetable and condiments statistics of Pakistan, Ministry of Food Agriculture and Livestock Division (Economic Wing), Islamabad, Pakistan, pp: 21-22.
- Alizai, A., 2001. Vegetable Botanist, Agriculture Research Institute, Sariab, Quetta, Balochistan, Pakistan. Personal Communications.
- Bentz, J.A., J. Reeves III, P. Barbosa and B. Francis, 1995. Nitrogen fertilizer effect on selection, acceptance and suitability of *Euphorbia pulcherrima*. (Euphorbiaceae) as a host plant to *Bemisia tabaci* (Homoptera:Aleyrodidae). Environ. Entomol., 24: 40-45.
- Ellis, B.W. and F.M. Bradley, 1992. The organic gardener's Handbook of Natural Insect and Disease Control. Rodale Press, Emmaus, PA., pp: 534.
- Guha, S. and B.K. Das, 1994. Effect on non-chemical methods and botanical insecticides on onion thrips, *Thrips tabaci* Lind (Thysanoptera:Thripidae) in onion crop in Balochistan. Sarhad J. Agric., 15: 619-624.
- Hassan, S.W. and M.F. Malik, 2001a. Effect of different levels of herbicides on weed population in onion. Pak. J. Biol. Sci., 4: 230-231.
- Hassan, S.W. and M.F. Malik, 2001b. Efficacy of cultural and chemical weed control in transplanted onion. OnLine J. Biol. Sci., 1: 825-827.
- Hassan, S.W. and M.F. Malik, 2002. Weeds management in broadcasted onion (*Allium cepa*). Asian J. Plant Sci., 1: 28-30.
- Khokhar, K.M., S.I. Hussain, T. Mahmood, Hidayatullah and M.H. Laghari, 2002a. Bulb yield and quality as affected by set size in autumn season onion crop. Asian J. Plant Sci., 6: 657-658.
- Khokhar, K.M., Hidayatullah, T. Mahmood, S.I. Hussain, M.H. Bhatti and M.H. Laghari, 2002b. Effect of seedlings/set size and planting times on bulb yield and quality in onion cultivars Phulkara during autumn. Asian J. Plant Sci., 6: 665-667.
- Malik, M.F. and L. Ali, 2002. Monitoring and control of codling moth (*Cydia pomonella*, Lepidoptera:Tortricidae) by pheromone traps in Quetta, Pakistan. Asian J. Plant Sci., 1: 201-202.
- Malik, M.F., A.G. Khan and S.W. Hussainy, 2002. Scouting and control of *Helicoverpa armigera* by synthetic pheromone technology in apples Asian J. Plant Sci., 6: 652-654.
- Malik, M.F., M. Nawaz and Z. Hafeez, 2003. Evaluation of onion crop production, management techniques and economic status in Balochistan, Pakistan. Submitted to Pak. J. Agron.
- Lu, F.M., 1990. Color preference and using silver mulches to control the onion thrips, *Thrips tabaci* Lind. Chinese J. Entomol., 10: 337-342.
- Roberts, H.A., 1973. Weeds and onion crop. J. Royal Hort. Soc., 98: 230-235.
- Roa, P.V.S. and T. Kumaraswami, 1986. A note on the control of onion thrips, *Thrips tabaci* Lind. Pesticides, 20: 61-62.
- Rusell, D.F., 1992. MSTAT-C. 87-Plant and Science building, Michigan State University, East Lansing, MI, USA.
- Srivastava, J.K. and P.R. Gupta, 1993. Efficacy of pesticide combinations on the control purple blotch disease and thrips in onion seed crop. Newsletter, Association Agric. Develop. Foundation, 13: 2-4.
- Shah, S.Y., M.F. Malik and L. Ali, 2002. Determination of the effectiveness of localized irrigation system in Balochistan. Asian J. Plant Sci., 1: 188-189.