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EFFECT OF DIFFERENT TRANSPLANTING DATES FOR THE MANAGEMENT OF THRIPS IN ONION

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ABSTRACT

Hossain MM, Khalequzzaman KM, Khatun MJ, Hossain MM, Alam MS (2014) Effect of different transplanting dates for the management of thrips in onion. *Int. J. Expt. Agric.* 4(4), 9-13.

The field experiment was conducted at SRC, Bogra during Rabi season of 2013-14 to assess the effect of varying transplanting dates on thrips populations and onion bulb yield. The treatments were T_1= 20 November (1st transplanting); T_2= 05 December (2nd transplanting); T_3= 20 December (3rd transplanting); T_4= 05 January (4th transplanting) and T_5= 20 January (5th transplanting). Transplanting was done at 15 days interval from November to January. Results showed that early transplanting in 20 November and 5 December had fewer thrips (7.81 thrips/plant and 10.76 thrips/plant) than the subsequent ones. November transplant was free of thrips up to 9 weeks after transplanting (WAT), December transplanting up to 8 WAT and January transplanting up to 4 WAT. Onion bulb yields were also found to differ in descending order as follows: 20 November (21.85 t/ha)> 05 December (18.98 t/ha)> 20 December (18.50 t/ha)> 05 January (7.26 t/ha)> 20 January (5.28 t/ha).

Key words: *transplanting date, management, thrips, yield, onion*

INTRODUCTION

Onion (*Allium cepa* L.) is the most important spice crops in Bangladesh. Total production of onion in Bangladesh is about 13.40 lac metric tons of bulbs from 1.80 lac hectares of land (AIS 2014). Mature onion bulbs are eaten raw as salad. They are cooked in a variety of ways such as fried, boiled and roasted (Kochar 1986; Purseglove 1992). Green onion leaves and white leaf bases before the bulbs are formed are eaten raw, alone or in Salads (Purseglove 1992). Onion cultivation is carried out both during the wet season from June to October and during the dry season from December to May (Ebenebe 1980). Onion is attacked by several pests that seriously reduce yield by stunting or kill the plants. Crop quality is frequently impaired by thrips. Onion thrips (*Thrips tabaci* L.) are polyphagous and have been recorded on more than 300 species of plants (Straub and Emmett, 1992). John and Mann (1963) considered them to be the most severe pests of onion and their allies and attacks by thrips can totally destroy young plants. Thrips feeds on sap from leaf epidermal cells, which become air-filled and thereby exhibit silvery sheen that is characteristics of damage by this insect (Jones and Jones, 1974). Infested leaves may become twisted. Young onion plants are more susceptible and may be killed by heavy thrips attack (Lewis 1973). Raheja (1973) observed that damage by thrips in early stages of crop growth would seem to be more important and is likely to result in substantial reduction in yield. Anon. (2004) found that large number of thrips kill onion seedlings, while damage to older plants by thrips may cause crops to mature early and, subsequently reduce yields. Thrips can also act as vectors of viral diseases. Lewis (1973) observed that time of sowing and harvesting crops can also reduce the severity of injury caused by thrips. Adesiyun (1981 & 1982) found that damage caused by shoot flies to sorghum planted early in the season was low and insignificant and this low population was on the scanty vegetation during the dry season. Kisha (1977) stated that early transplanted onions were usually well established before attack began in mid-February. Farmers apply chemicals indiscriminately, whenever presence of thrips is noticed in onion. Sowing time provides insect control without any additional costs, acts as preventive measure against buildup of insect with other method of pest control and free from environmental pollution problems. Therefore, the study was conducted to assess the effect of varying transplanting dates on thrips populations and onion bulb yield.

MATERIALS AND METHODS

The study was conducted at Spices Research Centre, Shibganj, Bogra during Rabi season of 2013-14. The experimental plot was prepared with five ploughings and cross ploughings followed by laddering to break the clods as well as level the soil. The weeds and stubbles of previous crops were collected and removed from the soil. The unit plot size was 3 m × 1.2 m and spacing was 15 cm × 10 cm. The treatments were T_1= 20 November (1st transplanting); T_2= 05 December (2nd transplanting); T_3= 20 December (3rd transplanting); T_4= 05 January (4th transplanting) and T_5= 20 January (5th transplanting). Treatments were assigned in a randomized complete block design (RCBD) with three replications. BARI Onion 4 was used as test crop for this trial. The crop was planted as per date mentioned in the treatments. In addition to 5 t/ha of cow dung, the crop was fertilized with $N_{120}P_{40}K_{75}S_{30}$ kg/ha. The entire amount of cow dung TSP and ½ of N and K were applied during final land preparation. The rest N and K was applied in two equal splits as top dress at 25 and 50 days after transplanting (DAP) (Anonymous 2010). Three weeding were done at 25, 50 and 75 DAP. To control purple blotch disease, the crop was sprayed three times with Rovral 50 WP @ 2g/l of water at 35, 45 and 55 DAP. Three irrigations were done at 10-20 days interval during vegetative growth stage. The whole experimental plot was kept free

from spraying of any insecticides. Depending on the maturity, the crop was harvested through 18 March to 2 May 2014. Thrips population was counted at 7 days interval starting from the first appearance of infestation. Number of thrips (both nymphs and adults) was recorded from 20 randomly selected plants in each plot by keeping a white paper below the plant and then shaking the plants with finger. Another data were recorded on plant height, bulb weight and bulb yield. The recorded data were analyzed and mean values were adjusted and separated by DMRT according to Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Meteorological data during the growing period with mean thrips population are presented in Table 1 and mean number of thrips population per plant observed at different dates in onion are presented in Fig. 1. It is evident from the study that there thrips population increased gradually from first week of February to second week of April and after that it was declined. The population density increased from 3.2 to 5.26 thrips/plant during 7th February to 23rd February. During the month of March, its population increased from 8.57 to 14.82 thrips/plant (1st March to 23rd March). The peak population was recorded on 10th April (21.25 thrips/plant). Afterward, the pest population declined from 21.25 to 15.01 thrips/plant during Mid April. The sudden drop in population may be due to maturation of crop, leaf hardening and migration of thrips to other crops. Hussain *et al.* (1997), and Hyder and Shariff (1987) also found almost similar findings. Hussain *et al*. (1997) reported that population of the *Thrips tabaci* began to build up in early February and reached maximum during April.

Table 1. Meteorological data during the growing period with mean thrips population of onion

Date of observation	Average temperature (°C)	Relative humidity (%)	Rainfall (mm)	Mean thrips population/plant
07 February 2014	20.25	79.3	00	3.2
15 February 2014	20.50	79.1	00	4.77
23 February 2014	22.05	75.6	00	5.26
1 March 2014	24.20	70.6	00	8.57
9 March 2014	24.80	66.5	00	8.85
17 March 2014	27.05	65.3	00	9.98
25 March 2014	26.65	64	00	14.82
02 April 2014	28.15	59.3	00	18.35
10 April 2014	28.50	59.1	00	21.25
17 April 2014	28.95	58.2	00	15.01

Source: Meteorological station, Bogra

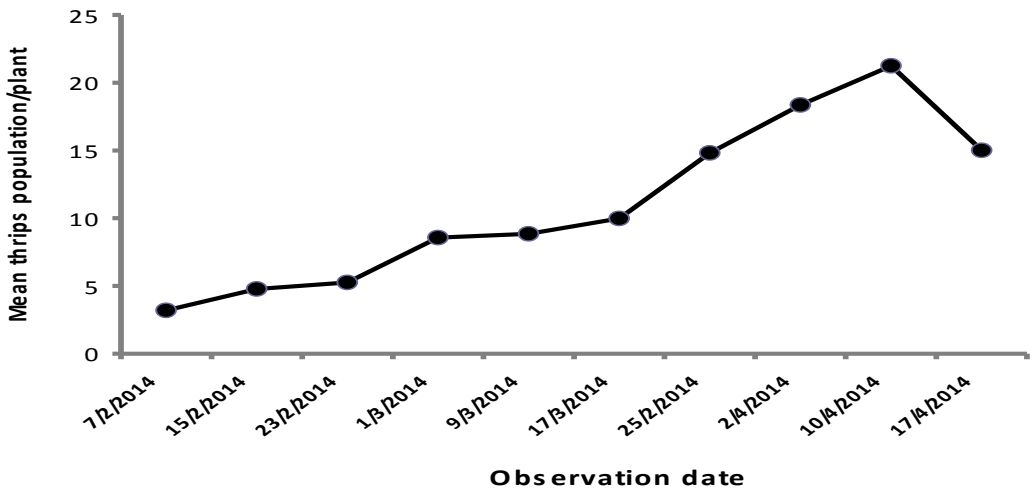

Fig. 1. Mean number of thrips population per plant observed at different dates in onion

Relationship between thrips population and weather parameters in onion

The relationship between temperature and thrips population in onion are presented in Fig. 2. There was strongly positive correlation between temperature and thrips population in onion. The regression equation was y =2.1622x- 56.853 and correlation coefficient was r =0.9152**. The figure indicated that thrips population was increased with the increase of temperature. Observation are compatible with those of Domiciano *et al.* (1993) who observed that typical condition which favored rapid increase in the thrips population were temperature (20.29°C) and the absence of rainfall.

The correlation and regression relationship between relative humidity and thrips population in onion are presented in Fig. 3. Thrips population was negatively correlated with relative humidity in onion. The regression equation was y = -0.6954x+58.085 and correlation coefficient was r = -0.9251**. The figure indicated that thrips population decreased with the increase of relative humidity.

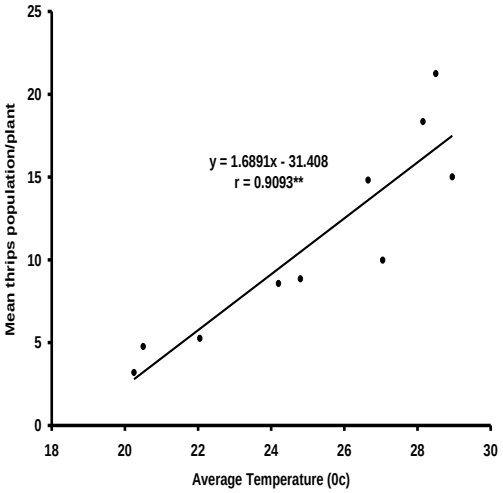

Fig. 2. Relationship between average temperature (0c) and thrips population in onion

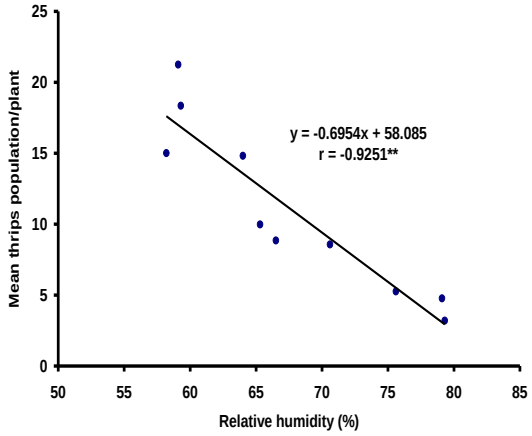

Fig. 3. Relationship between relative humidity (%) and thrips population in onion

Effectiveness of different planting dates on thrips population and onion bulb yield

Effect of date of transplanting on thrips population and bulb yield of onion are presented in Table 2. Planting was done one after another in order to assess whether early planting had any advantage reducing insect pests and increasing bulb yield of onion. The lowest number of thrips population (7.81 thrips/plant) was found from November, 20 transplanting followed by December, 05 (10.76 thrips/plant), December, 20 (14.62 thrips/plant) and January, 05 (19.49 thrips/plant) while highest number of thrips population (23.42 thrips/plant) was observed from January, 20 transplanting. Population of thrips was low up to the third week of February even on the early transplant and would therefore require no insecticidal spray (Fig. 1). This supported the findings of Pollard (1955), who reported that careful selection of sowing date makes it possible to ensure that the vulnerable stage in a crop does not coincide with the period of pest abundance. This was also in agreement with Kranz *et al.* (1977), who found that the crop can be protected by bringing forward the planting date so that the maximum population of thrips does not coincide with the seedling stage. Lewis (1973) observed that time of sowing and harvesting crops can also reduce the severity of injury. Kisha (1977) stated that early transplanted onions were usually well established before attack began in mid February. The number of thrips was low in February probably because the temperatures are relatively low, 25-26°C, which also agreed with Franssen and Huisman (1958) who reported that infestation of *Thrips angusticeps* Uzel during rainy and cool seasons were significantly lower than those during dry and hot seasons, presumably because of high larval mortality and slower population growth rates (Kirk 1997). On the other hand, significantly the highest plant height (65.83 cm) with lowest thrips population was recorded from November, 20 transplanted seedlings which was statistically similar to December, 05 (64.50 cm) transplanted seedlings and the lowest plant height (23.42 cm) with higher thrips population was observed from late transplanted seedlings (like January, 20 transplanted seedlings). Patel and Patel (2012) reported that plant height was significantly and negatively correlated with thrips population. It indicated that as thrips population increases, plant height decreases or vice versa.

Table 2. Efficacy of different treatments to control of thrips in onion

Treatments	**Mean no. of thrips/plant**	**Plant height (cm)**	**Bulb weight (g)**
November 20, 2013	7.81 e	65.83 a	76.23 a
December 5, 2013	10.76 d	64.50 a	73.80 a
December 20, 2013	14.61 c	45.63 b	71.93 a
January 5, 2014	19.49 b	32.97 c	31.43 b
January 20, 2014	23.42 a	26.17 c	25.17 c
CV (%)	5.09	7.47	4.00

Mean followed by the same letter (s) in the same column did not differ significantly from each other at 5% level by DMRT

Results on effect of different transplanting times on bulb yield of onion are presented in Fig. 4. The highest onion bulb yield (21.85 t/ha) was obtained from November 20, 2013 transplanted seedlings which was

statistically similar to December 5, 2013 (18.98 t/ha) and December 20, 2013 (18.50 t/ha) transplanted seedlings. The lowest (5.28 t/ha) bulb yield was obtained from January 20, 2014 transplanted seedlings which was followed by January 5, 2014 (7.27 t/ha). Kisha (1977) found that early transplanted onions produced significantly higher yields than onions transplanted later. He noted that low yields of onion transplanted from December onwards were attributable to thrips damage on the young plants, so that to obtain reasonable yields, insecticides had to be applied. Raheja (1973) also stated that early stages of growth are likely to be more sensitive to loss of sap due to feeding of the thrips and damage. Ibrahim and Adesiyun (2009) also showed that onion bulb yield up to 47 t/ha could be attained from November transplant, 40 - 44 t/ha in December transplant, 12 - 15 t/ha in January transplant, 5 - 6 t/ha in February transplant and 1 - 2 t/ha in March transplanted seedlings.

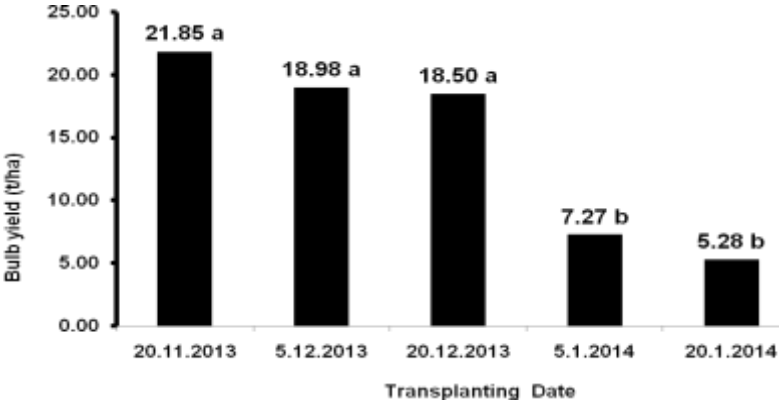

Fig. 4. Effect of different transplanting times on bulb yield of onion

CONCLUSION

From the above study, it may be concluded that early transplanting (20 November to 20 December) resulted lower thrips population and higher bulb yield of onion.

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