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Effect of Weather and Date of Transplanting on Caseworm (*Nymphula depunctalis*) Incidence

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A B S T R A C T

Caseworm, *Nymphula depunctalis* infestation was started from very initial stage (15 DAT) and lasted upto 75 DAT. The highest peak (21.25 percent) was recorded at 45 DAT while the infestation was above ETL upto 60 DAT. Among the weather parameters, rainfall showed significant positive correlation (r=0.828) and minimum temperature as well as number of rainy days showed nonsignificant but strong positive correlation with *N.depunctalis* infestation (r=0.789 & 0.806, respectively). Study on transplanting dates showed a significant impact on the pest infestation. Crops which were transplanted before first half of July showed negligible infestation (3.2-6 percent). But when transplanting was done on 15thof July, the crop was just above ETL and the last transplanting date (5th August) was worst affected by *N. depunctalis* with 31.65 percent infestation. From the study, it can be recommended that transplanting of *Sali* rice should be done before 15th of July in the *N. depunctalis* endemic areas.

Introduction

The rice caseworm, *Nymphula depunctalis* (Guenee) (pyralidae: Lepidoptera) is a serious pest of rice in Assam particularly in *Sali* season (monsoon crop:transplanted lowland rainfed rice and deep-water rice). *N. depunctalis* is widely distributed in rice growing counties of Asia, Australia, America and Africa (Dale, 1994).The pest occurs in the fields with prolonged standing water in the vegetative stage of the rice plant (Pathak and Khan, 1994). Larvae of *N. depunctalis* are semi-aquatic in nature which requires standing water. Due to continuous rainfall and water stagnation in thefield of winter rice, infestation of *N. depunctalis* increased in a high rate during vegetative stage of the crop. In heavily infested area, entire crop may have to be resown or replanted (Srivastava,

2012).Infestation of *N. depunctalis* is localized in nature (Islam *et al.,* 2004), particularly in the areas where water stagnation is more or in the deeper part of the rice field. The larvae cut the leaf blade to produce a tubular leaf case and staying within the case, they scrap the green portion of the leaf leaving only the papery epidermis and veins. Infested plants appear whitish in colour due to scrapping of the green portion of the leaf but under heavy infestation they become straw coloured, remains stunted or die. Post infested areas show uneven flowering. Larval cases are found on plants and water surface and they move from one plant to another by floating on the standing water.

Information on incidence of *N. depunctalis* with date of transplanting is rare in our region where the pest is a major menace to the rice growing farmers. Moreover, influence of weather factors on *N. depunctalis* incidence is also rare. Therefore, the present investigation is undertaken to determine the effect of transplanting dates and weather parameters on the pest incidence.

Materials and Methods

The experiment was conducted at Regional Agricultural Research Station, Titabor which is the leading rice research station in entire northeastern regions of India. To study the influence of weather parameters on *N. depunctalis* incidence, a 400m^2 fixed plot was selected and observations on pest infestation were recorded at fortnightly interval starting from 15 days after transplanting (DAT) till last appearance of the pest. Crop was transplanted on 30th July, 2020. Infestation percentages were estimated from 10 randomly selected plants by counting the number of damaged and healthy leaves and expressed in percentage. Daily weather parameters were collected from meteorological observatory unit of RARS, Titabor and fortnightly averages were worked out for correlation analysis. To observe the case worm incidence with date of transplanting, 6plots (400m^2 each) from the seed production blocks of RARS, Titabor were selected with 6 different dates of transplanting (15th June 2020, 25th June, 2020, 05th July 2020, 15th July, 2020, 25th July and 5th August, 2020). Ranjit variety was selected for the experiment as it is the most popular variety of Assam and has large area coverage at the station. Plots were chosen in such a way that each plot provide a homogenous micro climate. Plots were selected in the boarder side area with more stagnant water. Observations on *N. depunctalis* incidence were taken at 30th and 45thDAT as these are the most vulnerable period of rice to *N. depunctalis* attack and mean of the two dates were worked out. Crop was grown following the standard package of practices for *Sali* rice in Assam except utilizing the pest control measures.

Results and Discussion

Infestation of *N. depunctalis* was started from the initial stage and lasted upto 75 DAT (Table 1). The highest infestation rate 23.33 percent was recorded at 45 DAT on 10th September, 2020 which gradually declined and no infestation was recorded at 90 DAT on 22nd October, 2020. Dumra and Srivastava (2019) reported that *N. depunctalis* preferred early stage of rice crop and the maximum damage occurred within 30 days of transplanting. However, during present investigation, the highest infestation was recorded within 30th to 45thDAT and the infestation rate was considerably high (16.33 percent) upto60 DAT. Singh and Singh (2010) also reported that *N. depunctalis* prefer seedling and tillering stage of rice crop but does not occur after maximum tillering stage. Ramasubbaiah *et al.,* (1978), Litsinger *et al.,* (1994), Pulin and Khound (1998) and many other earlier researchers had reported highest

level of damage by case worm within 4-6 weeks after transplanting. But during present investigation, *N. depunctalis* infestation above ETL upto60 days might be due to climate change and other favourable factors like reduction of their bio control agents etc. High rainfall as well as more numbers of rainy days might favoured the semiaquatic pest to infest rice crop upto75 days.

Correlation analysis of *N. depunctalis* infestation percentage with meteorological parameters showed significant positive correlation (r=0.828) only with rainfall (Table 1). While minimum temperature (r=0.789) and number of rainy days (r=0.806) also showed non-significant but strong correlation and morning relative humidity showed moderate degree negative correlation (r=-0.551) with *N. depunctalis* infestation. While the other meteorological parameters showed weak correlation. The findings are in strong confirmation with Kalita *et al.*, (2019). They reported significant positive correlation of *N. depunctalis* infestation with maximum temperature, minimum temperature and rainfall and significant negative correlation with morning relative humidity. Gogoi and Bora (2013) also reported positive correlation between *N. depunctalis* incidence and total rainfall. Fei *et al.*, (1995) found that climatic factors like relative humidity, total rainy days and temperature were responsible for population build-up of *N. depunctalis*.

The study on transplanting date on *N. depunctalis* infestation showed a greater impact of transplanting dates on the pest infestation (Table 2). Crop transplanted during June and early July showed negligible infestation by the pest, which was below economic threshold level.

While the crop when transplanted on 15th of July was just above ETL on 30th and 45th DAT (mean=13 percent). But the last transplanting date (5th August, 2020) was worst affected by case worm with 31.65 percent infestation and the crop was unable to recover fully from the pest injury. Therefore, to minimize the attack of *N. depunctalis* on *Sali* rice, transplanting should be done within first half of July.

Table.1 Infestation percentage of *N. depunctalis*at fortnightly interval and average weather parameters

Date of observation	Infestation percentage	Temperature		Relative humidity		Rainfall	No. of rainy days	Bright sunshine hours
		Maximum	Minimum	Morning	Evening			
13.08.2020	19.00	33.95	24.97	95.60	77.07	175.90	9	4.85
27.08.2020	18.60	33.41	23.88	94.64	78.79	102.70	7	5.05
10.09.2020	21.25	33.08	23.94	95.36	81.07	111.00	6	3.56
24.09.2020	16.33	33.22	23.77	95.86	81.29	122.60	9	3.22
08.10.2020	4.00	32.70	23.45	96.43	82.00	57.00	5	3.38
22.10.2020	0.00	34.43	22.61	95.64	72.43	42.40	1	5.50
Correlation coefficient		**-0.253**	**0.789**	**-0.551**	**0.439**	**0.828***	**0.806**	**-0.20**

*Correlation is significant at the 0.05 level

Table.2 Infestation percentage of *N. depunctalis* with date of transplanting

Date of transplanting	30 DAT	45 DAT	Mean infestation percentage
15th June 2020	3.6	2.8	3.2
25th June 2020	5.8	6.2	6
05thJuly 2020	4.2	5.5	4.85
15th July 2020	12.6	13.4	13
25th July 2020	18.8	20.2	19
05th Aug 2020	30.5	32.8	31.65

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