

POPULATION DYNAMICS OF *OXYA HYLA HYLA* (SERVILLE) (ORTHOPTERA : ACRIDIDAE) ON RICE IN CACHAR DISTRICT OF ASSAM N E INDIA

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ABSTRACT : Population dynamics of *Oxya hyla hyla* was studied in three sites of Cachar District of Assam, viz. Dargakona, Dudhpatil and Kalain in three seasons (Shali, Boro, Aus) on rice during September, 2009-2010. During Shali season the maximum population (4.2 ± 0.86 nos./5 quadrat) was recorded on Dumsail variety on first part of November, 2009 in Kalain. In Boro season the maximum population (2.8 ± 0.66 nos./5 quadrat) showed by Chocklate variety on first part of April, 2010 in Dudhpatil. During Aus season the maximum population (4.2 ± 0.92 nos./5 quadrat) was shown by Krishna variety on last part of August, 2010 in Dargakona. A multiple correlation was employed which indicated significant relationship with all abiotic factors with variety Dumsail and Chatoki during Shali season and Sonamukhi variety during Aus season. Partial correlation (t-test) indicated significant effect with Chatoki variety by all the abiotic factors whereas temperature and rainfall were negatively significant with Kachal and Sonamukhi varieties.

Keywords : Population dynamics, *Oxya hyla hyla*, Rice, Cachar District, NE India.

INTRODUCTION

Rice, is the main staple food in Assam, grown on about 70% of the total cultivated land (3.64 million ha) in the state (Anonymous, 2003). It is warm season crop and thrives best in temperature range of 24-30°C, a constant plentiful supply of water and heavy clay soil (Pathak and Saxena, 1976). It is found that rice contains 8% protein, 2.5% fat, 90.3% carbohydrates and minor amount of iron and calcium. In Assam rice is mostly grown on the low-lying deltas of the Brahmaputra and Barak rivers (Bhattacharjee and Ray, 2010). It is attacked by some 54 species of insect pests and it has been estimated that each year these pests cause 25-30% losses. Grasshoppers, stem borers, leaf folders and mealy bugs are the major devastators (Inayatullah *et al.*, 1989). Grasshoppers are the most important insect pests of small grain crops (Hinks and Olfert, 1992). Their populations respond to a combination of interacting extrinsic (e.g. weather conditions) and intrinsic (e.g., biotic interactions) factors that vary spatially and temporarily (Belovsky & Joern, 1995; Joern, 2000; Branson *et al.*, 2006 and Jonas & Joern, 2007). Extrinsic factors such as weather variation can directly and indirectly affect grasshopper population dynamics (Joern, 2000; Branson *et al.*, 2006; Jonas & Joern, 2007 and Powell *et al.*, 2007). Most grasshoppers are Oligophagous and exhibit definite host preferences, according to which grasshoppers are classified as grassfeeders (graminivorous), forb-feeders (forbivorous) or a mix of the two (ambivorous or mixed feeders).

Practically no works on *O. hyla hyla* was carried out on population dynamics in north-east India in general and Barak Valley of Assam in particular. Keeping on view the importance of the polyphagous insect pest the present investigation was undertaken to study the population dynamics of grasshopper and its correlation with the environmental factors.

MATERIAL AND METHODS

The population dynamics of *Oxya hyla hyla* was studied in three seasons, viz. Shali, Aus and Boro during 2009-2010 in rice field at three different sites (Dudhpatil, Dargakona, Kalain) of the Cachar District of Assam. The observations were taken by quadrat method (1m x 1m) at ten days interval. Five random quadrats were selected from each site and each variety of rice. The crop field size was 0.134 ha. and a total of six varieties were studied in each season from all the three sites. Multiple correlation ('F'-test) was employed to correlate abiotic factors (Temperature, Relative humidity and Rainfall) with population fluctuation on various varieties of rice during different seasons.

RESULTS AND DISCUSSION

For population dynamics study of *O. hyla hyla* during Shali season, Joria and Ranjit varieties of rice in Dudhpatil area was selected. The study indicated that the maximum population 4.6 ± 0.51 nos./5 quadrats was recorded in Joria variety in later part of November, 2009 and in Ranjit variety the same 3.4 ± 0.51 nos./5 quadrats was observed in later part of October, 2009; but in Dargakona, Chatoki and Suiamara varieties were selected where maximum population 4 ± 0.70 nos./5 quadrats was recorded in Chatoki variety in later part of September, 2009 and in Suiamara variety the peak population was observed as 4.2 ± 0.51 nos./5 quadrats during middle of September, 2009. Whereas in third study site Kalain, the maximum population 4.2 ± 0.86 nos./5 quadrats was recorded on Dumsail variety in first week of November, 2009. A second variety Aizong, which registered maximum population as 4.6 ± 0.93 nos./5 quadrats in the same period too. Whereas minimum was recorded (0.6 ± 0.4 nos./5 quadrats) in Dumsail variety.

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Received 25.03.2012

Accepted 15.05.2012

The observation was taken on Aaswati and Chocklate varieties during Boro season in Dudhpatil area where maximum population (2.6 ± 0.6 nos./5 quadrats) was recorded in first week of April, 2010 on Aaswati variety. Maximum population of the pest species on Chocklate variety (2.8 ± 0.66 nos./5 quadrats) was also observed in first week of April, 2010. In Dargakona, Guchiboroa and Narayan varieties of rice were selected for the study, where the maximum population (1.4 ± 0.4 nos./5 quadrats) was recorded in Guchiboroa variety in first week of April, 2010 and in Narayan variety it was found as 1.2 ± 0.37 nos./5 quadrats at the middle part of the March, 2010. In Kalain among Bashful and Jaya varieties, the maximum population was recorded in Bashful variety which registered as 1.2 ± 0.49 nos./5 quadrats in last week of March, 2010 and in Jaya variety it was found to be 0.8 ± 0.58 nos./5 quadrats during last week of March to middle of April, 2010.

During Aus season in Dudhpatil site Kachal and Sonamukhi varieties were selected. The maximum abundance of population was recorded in Kachal variety (3 ± 1.14 nos. / 5 quadrats) in middle of September, 2010. Whereas in Sonamukhi variety it was 3 ± 1.09 nos./5 quadrats during last week of August, 2010. In Dargakona Krishna and Murali varieties were selected. The study indicated that maximum popu-

lation (4.2 ± 0.92 nos./5 quadrats) was recorded on Krishna variety in last week of August, 2010 and in Murali variety the same was 3 ± 0.71 nos./5 quadrats during Aug to September, 2010. In Kalain, the study was made on two varieties of rice viz. Mohanbhog and Terawali. The highest abundance of population (1.8 ± 0.8 nos./5 quadrats) was recorded in Mohanbhog variety during first week of September, 2010 and in Terawali variety the maximum population recorded was 1.8 ± 0.37 nos./5 quadrats during last week of July, 2010.

Study reveals that highest insect incidence occurred in Joria (4.6 ± 0.51) and Aizong (4.6 ± 0.91) varieties during Shali season in November, 2009 at Dudhpatil and Kalain as compared to other two seasons. It is also reveals that out of three study sites the abundance of *O.hyla hyla* was peak during July to September in Shali season which also corroborates the findings of Abdul Ghani *et al.* (2002), who reported *O.nitidula* was abundant at the same climatic regimes. Ansa *et al.* (2011) reported that *O.hyla hyla* was abundant in Bhimber district of Mirpur (Pakistan) where climatic parameters were more or less resembled. It was also observed that the pest prefers the middle stage to harvest stage of the rice crop. Kohler *et al.* (1999) worked on three different species of grasshopper and correlated it with environmental factors mainly temperature,

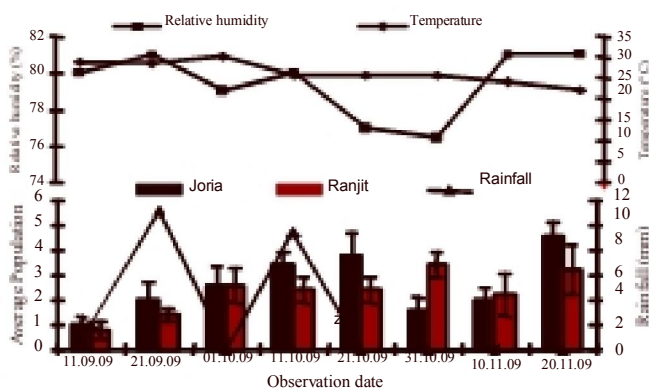


Fig. 1 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dudhpatil site during Shali season.

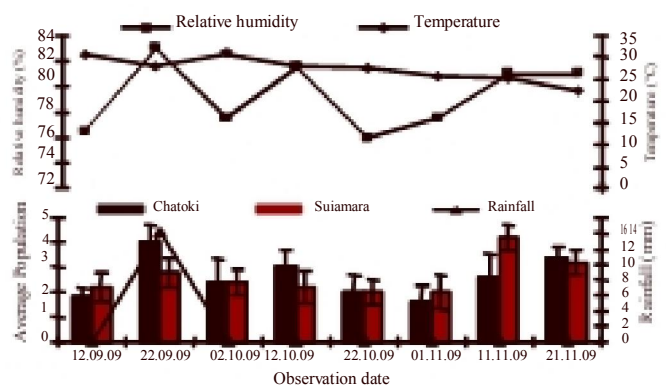


Fig. 2 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dargakona site during Shali season.

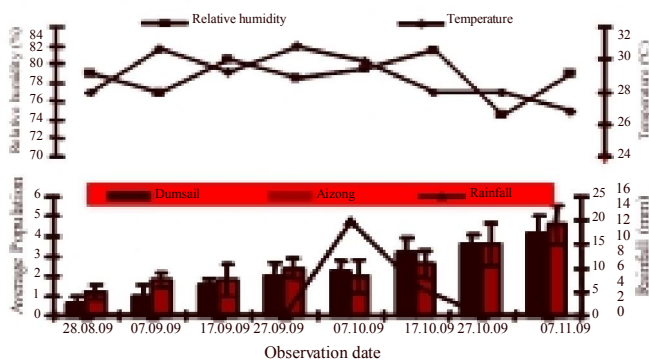


Fig. 3 Population dynamics of *O.hyla hyla* in relation to climatic variables in Kalain site during Shali season.

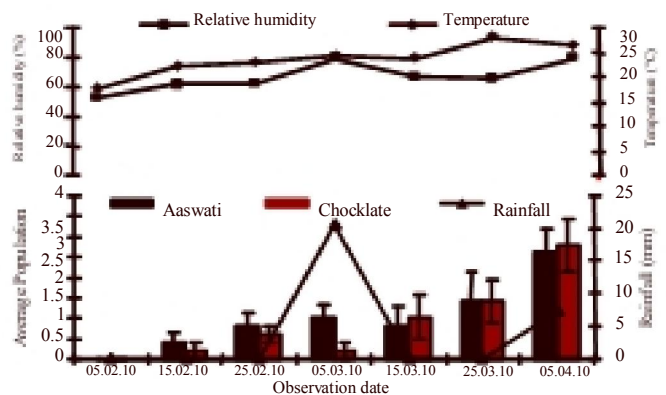


Fig. 4 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dudhpatil site during Boro season.

rainfall and sunshine which showed max. population during Sept. agreed our findings. Findings of Carter *et al.* (1998) sug-

gest that in Colorado, temperature condition for grasshopper development and reproduction are generally favourable.

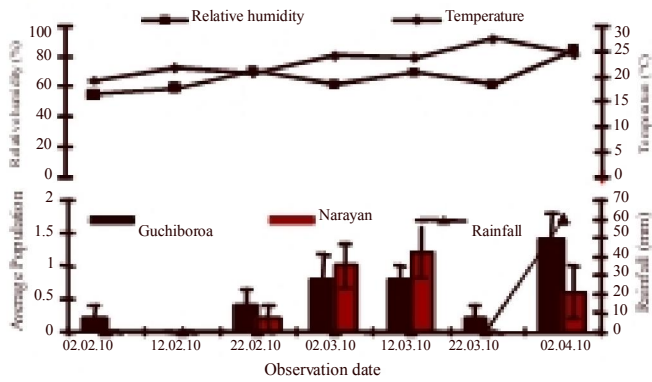


Fig. 5 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dargakona site during Boro season.

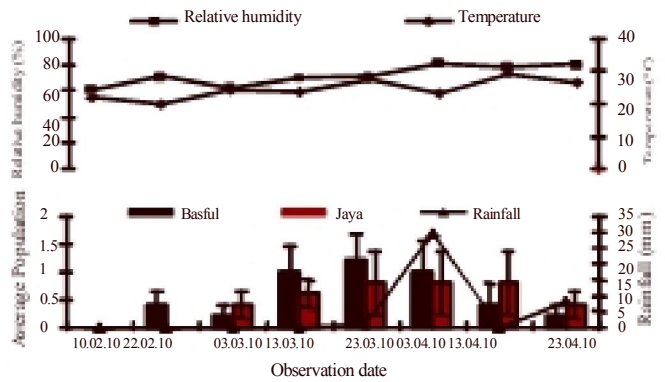


Fig. 6 Population dynamics of *O.hyla hyla* in relation to climatic variables in Kalain site during Boro season.

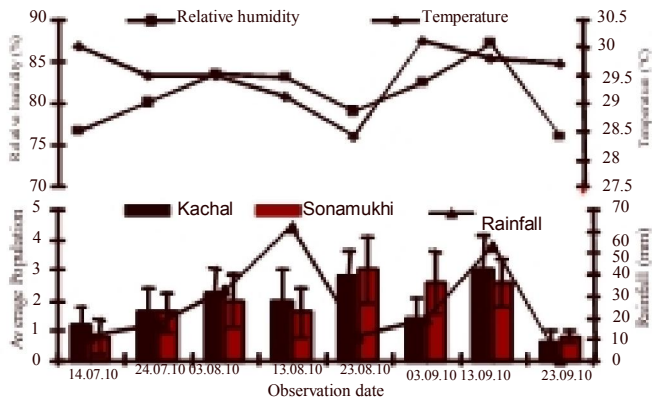


Fig. 7 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dudhpatil site during Aus season.

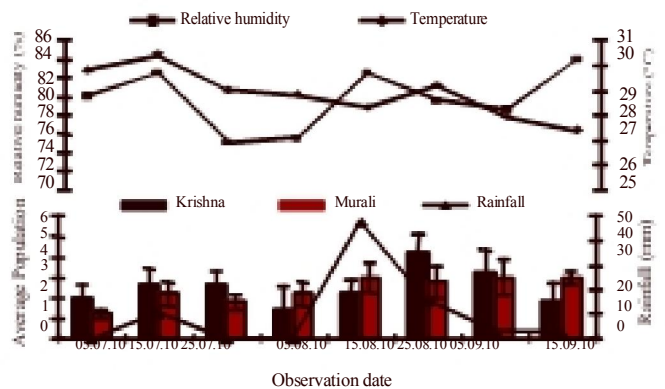


Fig. 8 Population dynamics of *O.hyla hyla* in relation to climatic variables in Dargakona site during Aus season.

Although the species belongs to Chrysomelid group but it showed peak abundance during October from the same field of study as the present investigation is made reported by Bhattacharjee and Ray (2010). However, Dudhpatil and Kalain sites are found to be most preferred sites by *O.hyla hyla* may be due to type of soil and absence of vegetation nearby crop field. Vegetation (grass, shrub and herbs) are known as alternative hosts for grasshoppers thereby the species migrated to vegetation in Dargakona study site.

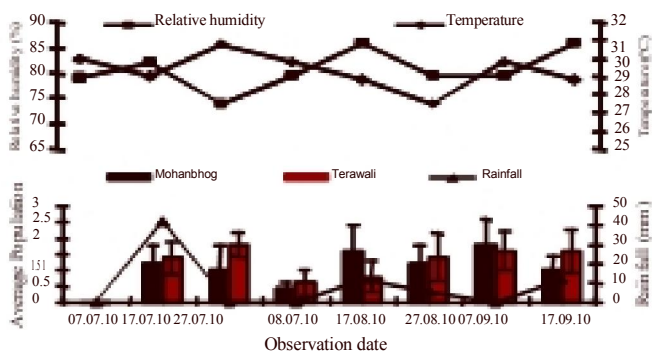


Fig. 9 Population dynamics of *O.hyla hyla* in relation to climatic variables in Kalain site during Aus season.

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