chapter 2

review of literature
2.1 REVIEW OF LITERATURE

*Leptocorisa acuta* (Thunb) (Hemiptera: Coreidae), is a major pest of the paddy crop all over the rice growing areas of India occurring in epidemic form sporadically. Various scientists all over the globe worked on various aspects about *L. acuta*. The distribution and activities of *L. acuta* (Thunb) in Philippines was studied by Uichanco (1921), Pathak (1968). In India, Banerjee and Chatterjee (1965) reported that *L. acuta* have been found to hibernate on trees during the relatively colder and drier months in December to March. In Papua-New Guinea, rice bug abundance depends on the availability of suitable host plants rather than on seasonal weather fluctuations, except for periods when adult aestivation occurs (Sands, 1977). In Japan, *L. chinensis* hibernates on ferns and weeds under humid and shady conditions (Ito, 1978).

The population dynamics study of this species has been done by many authors. Biswas (1953) observed that it meets a natural death of paddy bug with couple of good shower or with the fall of temperature. Sen (1955) who observed that intermittent shower of rain in April - May accompanied by high temperature 29.4 °C - 37.7°C help in rapid multiplication of the rice bug. Sen and Choudhuri (1959) stated that when there was early summer of rain in April and May with high temperature a danger of epidemic outbreak of the rice bug. Ghose and Ghatge
(1960) studied that the seasonal incidence of rice bug at Cuttack and observed that the infestation was severe when the atmospheric temperature was 27 °C and relative humidity was 80.6 % - 82.1 %. Dass (1961) reported that in Assam rice bugs were active from June to August and then from September to October and in west Bengal from August to September and again from October to November, while in Bihar the bugs were active from August to September and again from October to November. Singh and Chandra (1967) studied the correlation of population with abiotic factors and proved positive relation with temperature, relative humidity and rainfall. Srivastava and Saxena (1967) studied that light intermittent shower of rain during April to May with high temperature favoured the build up of pest population. High rainfall during April to July and November to January causes increases in O. poecilus (Hemiptera: Pentatomidae) populations. (Sutherland and Baharally, 2003).

L. oratorius has been reported to reproduce on a number of wild grasses in South-east Asia, although as food plants wild grasses were inferior to rice (Uichanco, 1921; Corbett, 1930; Morrill et al., 1990). L. oratorius reproduces on weeds (Rothschild, 1970, Reissig et al., 1986). Reaction of gundhi bug, Leptocorisa varicornis Fabricius to some food plants by Kalode et al., 1969. Lal and Mukherjae (1975) who reported that L.acuta, L. varicornis overwintered feeds on new leaves of Mango but also overwintered on Blumea lacera. Rajapakse and Kulasekera (1980) surveyed the alternative hosts of the rice bug L. oratorius in Sri-lanka and reported that the bugs survived on graminaceous weeds. Dalvi et al., 1985 work on biology of rice ear head bug L. oratorius during off season and reported five alternative hosts. Sen and Choudhury (1959), Srivastava and Saxena (1967) also worked on
alternative host of *L. acuta*. On plant host of the rice bug was studied by Litsinger *et al.*, (1993).

Suwat (1994) who studied the occurrence of *Leptocorisa* spp in wet and dry seasons of the years 1990-1992 on recommended rice varieties. Gary *et al.*, 2004 evaluated four rice lines viz., C2, IR64, PSBRc20 and IR72164-201 in a green house condition at IRRI, Philippines for rice yield and grain quality and registered that IR64, PSBRc20 had higher yield than IR72164-201 and C2, suggesting host plant tolerance to rice bug feeding.


Pathak and khan (1994) reported that *L. acuta* is phototropic and diurnal and is most active during early mornings and evenings when the sun is not strong. On
sunny days, the insects hide at the basal parts of the plants. Ray and Bhattacharjee (2006) worked on the rice agroecosystem in Assam and found that diurnal insect activity was higher at 8-11 hrs and less at 11-13 hrs. thereafter increased at 13-18 hrs.

Morphometric characters were widely used by researchers to determine different developmental stages (Fink, 1984, Stark, 1988, Holloway, 1991, Guglielmino et al., 2006, Kayss et al., 2006). Mark et al., (2010) studied on variability in head shapes in three populations of the Rice Bug *Leptocorisa oratorius* (Fabricius) (Hemiptera: Alydidae). Ali and Hazarika (1994) reported on seasonal variation of certain morphological parameters of rice hispa, *Dicladospa amigera* (Coleoptera: Chrysomelidae). Seasonal variation of body weight, lipid reserves, blood volumes and haemocytic population of *Antheraea assama* (Lepidoptera: Saturniidae) was studied by Bordoloi and Hazarika (1992).


A good number of reports are available on the effectiveness of insecticides against *L. acuta*. Angente et al., (1983) work on the residues of Carbaryl, Lindane and Monocrotrophos on rice treated for control of rice bug, *Leptocorisa oratorius* (Fab.) and reported that reported that Monocrotrophos @ 75 kg a.i/ha was the most effective insecticide against the rice bug which caused 90% mortality throughout the 5 day sampling period. The effectiveness of Monocrotrophos was also worked by other scientists like Kay et al., (1993); Dhingra et al., (2003); Raghu Ramudu and Misra, (2005) who registered 90 %, 99%, 87.23 % reduction rate, respectively with Monocrotrophos 500 g a.i/ha. A number of insecticides were evaluated to test their efficacy against rice gundhi bug by Kalode et al., (1969), Pangtey (1990), Misra (1999), Jena et al., (1990). A note on the chemical control of earhead bug, *Leptocorisa acuta* (Thunb.) (Hemiptera: Coreidae) on Paddy (Krishnamurthy et al., 1977). Dalvi et al., (1985) worked on the efficacy of some insecticides against rice earhead bug, *Leptocorisa oratorius* (Fabricius). Efficacy of dust formulation of insecticides for the control of gundhi bug *Leptocorisa oratorius* (Fabricius).
Krishnakumar and Visalakshi (1989) studied on relative toxicity of insecticides to rice bug *L. acuta* and reported that Malathion was the most highly toxic to rice bug. Krishnakumar and Visalakshi (1995) reported that Malathion, Methyl Parathion and Fenthion were found to be effective against rice bug. Krishnaiah *et al.*, (1996), Verma and Gupta (2001) studied on the effectiveness of some insecticides against *Cnaphalocrosis medinalis* and *Leptocorisa varicornis* on Paddy crop. Misra (2003) evaluated some new insecticides against rice gundhi bug and reported highest reduction of bug population with DDVP and Avermectin, Singh *et al.*, (2009) reported that Monocrotphos and Malathion is most effective against gundhi bug and field treated with these insecticides recorded good yield.

Padmanabhan and Chaudhary (1990) studied on entomogenous nematode *Hexamermis* Sp. (Mermithidae: Nematode) infection on stink bug *Leptocorisa acuta* (Hemiptera : Coreidae). Virulence of *Beauveria* sp., *Metarhizium* sp. and *Paecilomyces* sp. against brown planthopper (*Nilaparvata lugens*) was reported by Pham *et al.*, (1994), Srinivas (1995). Baruah *et al.*, 2003 worked on pathogenicity of four entomogenous fungi from north-east India to insect pest of rice and reported more than 50 % mortality of pest by *Beauveria bassiana* and *Fusarium oxysporum*. Loc *et al.*, (2005) tested 12 selected isolates of *Metarhizium anisopliae* and *Beauveria bassiana* against *Leptocorisa acuta* and reported 57.5 to 77.7 % mortality percentage of *Leptocorisa acuta*. Dhanapati *et al.*, (2010) studied on bioassay of *Pochonia* (Verticillium) *lecanii* against tea aphid and red spider mite and their field density in Manipur. Effect of liquid formulations of *Pochonia* (Verticillium) *lecanii*
(Zimm.) viegas on viability and virulence against mealy bug was reported by Chavan and Kadam (2010).

Effects of neem and nochi on rice bug Leptocoris acuta was studied by Durailal and Venugopal (1993). Effectiveness of neem based insecticides against pests of rice was reported by Raghubaran and Rajasekaran (1996), Kaul and Sharma (1999). Laboratory evaluation of neem formulation against rice gundhi bug, Leptocoris acuta (Thunberg) was studied by Dhaliwal (2002). Farmers participatory assessment of neem based insecticide in controlling the ear head bug (Leptocoris acuta) in rice (Ponnusamy, 2003). Jeyarajan et al., (2003) reported some new botanical insecticide for managing rice bug. Ovicidal and ovipositional effects of neem (Azadirachtin indica A. Juss) extracts on rice bug, Leptocoris chinensis (Dallas) was reported by De-ling et al., (2005).

Dass (1977) worked on predators of rice bug and reported a predatory spider
(Oxyopes assamensis Tikder.) and tiger beetle Cicindella sexpunctata Linn. as
principal natural enemies of rice bug. Rothschild (1970) worked on ecology of
Leptocorisa sp. and reported Anaxipha spp. (Gryllidae) and Conocephalus spp
(Tettigoniidae) were the principal predator. Ali (1977) reported on the predator birds
of Eastern Himalayas. Rai et al., 1988 worked on natural enemies of rice gundhi bug
Leptocorisa varicornis Fabricious in eastern part of Uttar Pradesh.

A good number of reports were available regarding ITK from different part of
the country. Sardana et al., (2005) reported on development and validation of
adoptable IPM in okra through farmers participatory approach. Traditional pest
studied on Indigenous knowledge and sustainable agricultural resources
management under rainfed agro-ecosystem. Indigenous pest and disease
management practices in traditional farming systems in north east India was
reported by Chhetry and Belbahri (2009). Das and Saikai (2010) reported on
Indigenous Technical Knowledge for management of rice pests of Assam.