soil after both rice crops. However, the lesser dose of 0.4 kg and below did not leave any residue after the harvest of the summer crop. 2,4-D EE residue was detected in rice grain and straw when it was applied at 0.6 and 0.8 kg (Table 2).

More amount of residues were accumulated in the straw than in grain. Similar reports were noted from Chen (1981) who reported that butachlor left very small concentration of residue in both grain and straw and the residues were comparably higher in straw than in grain. Though small amount of residues were detected in grain and straw, all these were far below the maximum residue limit and these herbicides thus found safe to use.

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POPULATION TRENDS OF RICE GREEN LEAFHOPPERS IN CAUVERY DELTA ZONE OF TAMIL NADU

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ABSTRACT

Peak occurrence of green leafhoppers (GLH) was observed during September and October months of the three years 1991 - '93. The species composition in light-trap and field collections revealed that *Nephotettix virescens* dominated over *N. nigropictus*. The seasonal incidence of GLH in the three defined seasons of Cauvery Delta Zone revealed that early planting of the crop in *Kuruvai* season *i.e.*, July 25 recorded low incidence of GLH than the late planted crop. The early as well as late planting of *samba* and *thaladi* season was susceptible to GLH. Among the weather factors, relative humidity and minimum temperature influenced the pest population.

KEY WORDS : Green leafhopper, species, rice, season, field population, light-trap, correlation, regression

Green leafhopper (GLH) complex is one of the most destructive groups of rice pest through out South and South-east Asia. *Nephotettix virescens* (Distant) and *Nephotettix nigropictus* (stal.) populations are the dominant species in India (Ramakrishnan, 1983). N. Virescens appearing in epidemic and endemic forms in certain areas has been reported to be a vector for the Rice Tungro Virus. Hence the pest population occurrence in the three defined seasons of the Cauvery Delta Zone and its dominance in each season and its relationship to metereological factors was focussed for the current studies.

MATERIALS AND METHODS

The GLH population was monitored using a Robinsom light-trap at the Tamil Nadu Rice Research Institute, Aduthural with a source light of 125 watts mercury vapour lamp, for three years (1991 - 1993). The light-trap was operated for 12h daily from 6.00 P.M. to 6.00 A.M. and daily

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catches were recorded. GLH field samples were also regularly collected at weekly intervals during the peak periods by hand nets and the species composition was arrived at. Field couts were also taken at weekly intervals in the monthly planting trials using ADT 36, ADt 38 and ADT 39 varieties on 5 units selected at random, covering 20 hills per unit, thus accounting for number of leafhoppers in 100 hills for each observation. Observations were taken for three years (1991-1993) covering *kuruvai, samba* and *thaladi* seasons.

Correlations were established between the incidence of GLH in the field and the collections from light-trap. The weekly mean collections and field population data were utilised for the analysis. Simple correlation also was worked out with the weekly mean GLH trapped to the weekly mean weather parameters. The inter- relationship between GLH in light-trap collections and field counts to weather factors was regressed and the multiple regression equations were fitted for the three seasons *Kuruvai, Samba* and *Thaladi* of the year 1993. The weather parameters considered were: X_1 Maximum temperature, X_2 Minimum temperature, X_3 Relative humidity, X_4 Wind velocity, X_5 Sun shine hours and X_6 Rainfall.

Table 1. Light trap catches of GLH *N. virescens* population during 1991 - 1993

Month	Year			Mean
	1991	1992	1993	
January	7.00 (1099)	7.08 (1198)	6.56 (704)	6.88 b (1000)
February	5.79 (329)	5.38 (215)	6.21 (183)	5.46 cd (242)
March	4.02 (55)	3.26 (25)	4.24 (69)	3.83 of (49)
April	3.21 (24)	4.09 (59)	3.29 (25)	3.52 f (36)
May	4.70 (109)	4.70 (109)	5.21 (183)	4.87 de (133)
June	4.72 (111)	5.10 (180)	5.09 (163)	5.01 de (151)
July	5.94 (380)	4.53 (92)	5.34 (209)	5.27 cd (227)
August	6.06 (426)	6.68 (737)	6.74 (847)	6.47 bc (670)
September	10.02 (22419)	11.30 (80818)	9.10 (8513)	10.16 a (37583)
October	8.81 (8704)	11.01 (60525)	9.88 (1953)	9.90 a (29589)
November	6.67 (772)	6.01 (408)	6.13 (613)	6.27 bcd (356)
December	7.83 (2522)	5.12 (166)	5.31 (201)	6.05 bcd (96.3)

* The values are log x^{+1} transforred values: figures in parentheses are actual values; In a column means followed by a common letter are not significantly different at 5 % level by DMRT

RESULTS AND DISCUSSION

Population of *Nephotettix spp* in the light trap revealed that the pest was trapped throughout the year and it was more during September (37853 and October (Table 1). Catches were low from February to July. The composition of GLH species from light trap catches and field sampling indicated that the population of *N. virescens* was more than *N. nigropictus* indicating the dominance of *N. virescens*. In light-trap catches, it ranged from 65.2 to 78.6 per cent of total population and in field collections, it ranged from 65 to 77 per cent. This supports the results of the study on species composition that *N. virescens* dominated among

Table 2. Multiple regression analysis between GLH population and weather elements (n-20 for each seasons

variable	Senson								
	Kuruvai			Samba			Thaladi		
	Reg Coeff. (b)	Std Err. (SEb)	't'	Reg. Coeff. (b)	Std. Err. (SEb)	't'	Reg. Coeff. (b)	Std Err. (SEb)	't'
x1 Maximum temperature	1.276	1.074	1.188	-1.209	1.355	-0.888	1.374	0.755	1.820*
x2 Minimum temperature	-0.619	2.583	-0.239	-1.783	3.295	-0.541	0.899	1.397	0.643
x3 Relative humidity	0.585	0.599	0.977*	2.340	0.201	1.162	1.089	0.756	1.442*
x4 Sunshine hours	-0.877	1.622	-0.541	0.303	1.853	0.164	-1.476	1.135	-1.300
x5 Rainfall	0.1429	0.158	-0.905	-0.672	1.097	-0.163	0.159	0.127	0.125
Constant term	R2 = 0.598 A = -55.408			R2 = 0.651 A = 112.117			R2 = 0.763 A = 66.823		

* Significant at 0.05 % level

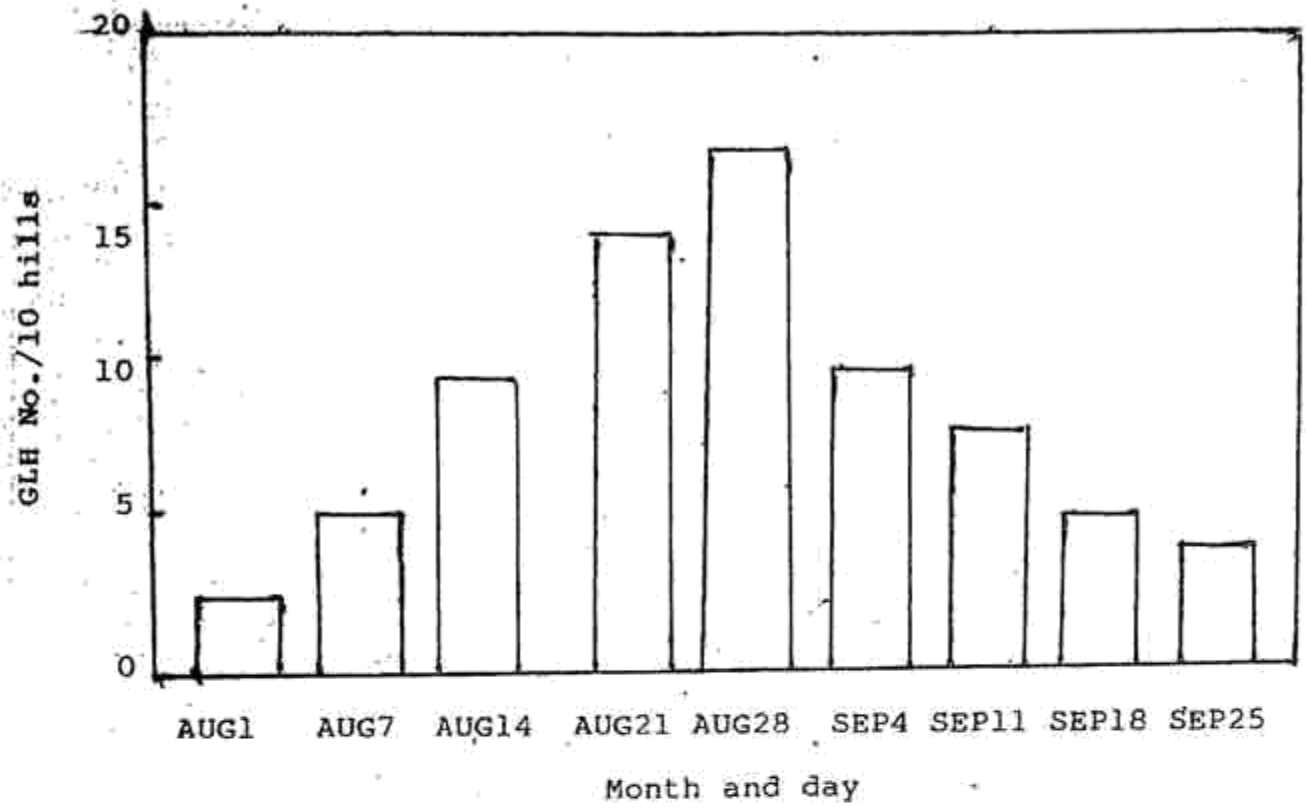

Fig. 1 Seasonal incidence of GLH on ADT 36 - "Early *Kuruvai*"

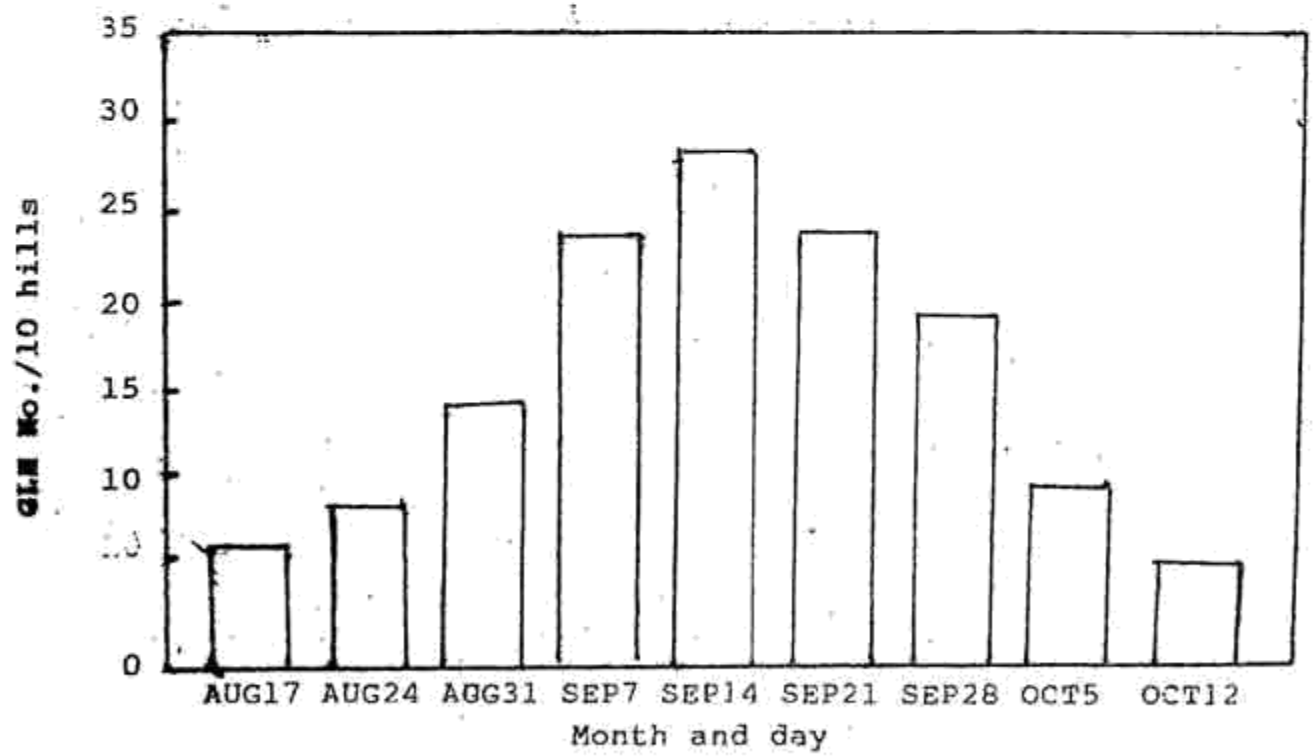

Fig. 2 "Late *Kuruvai*"

populations of *Nephotettix spp*, among Asian species (Ghauri, 1971).

During *kuruvai* seasons, ADT 36, early (July 25th) planted crop recorded low levels of GLH than late planted crop (August 10th). The peak incidences of GLH was seen on early planted

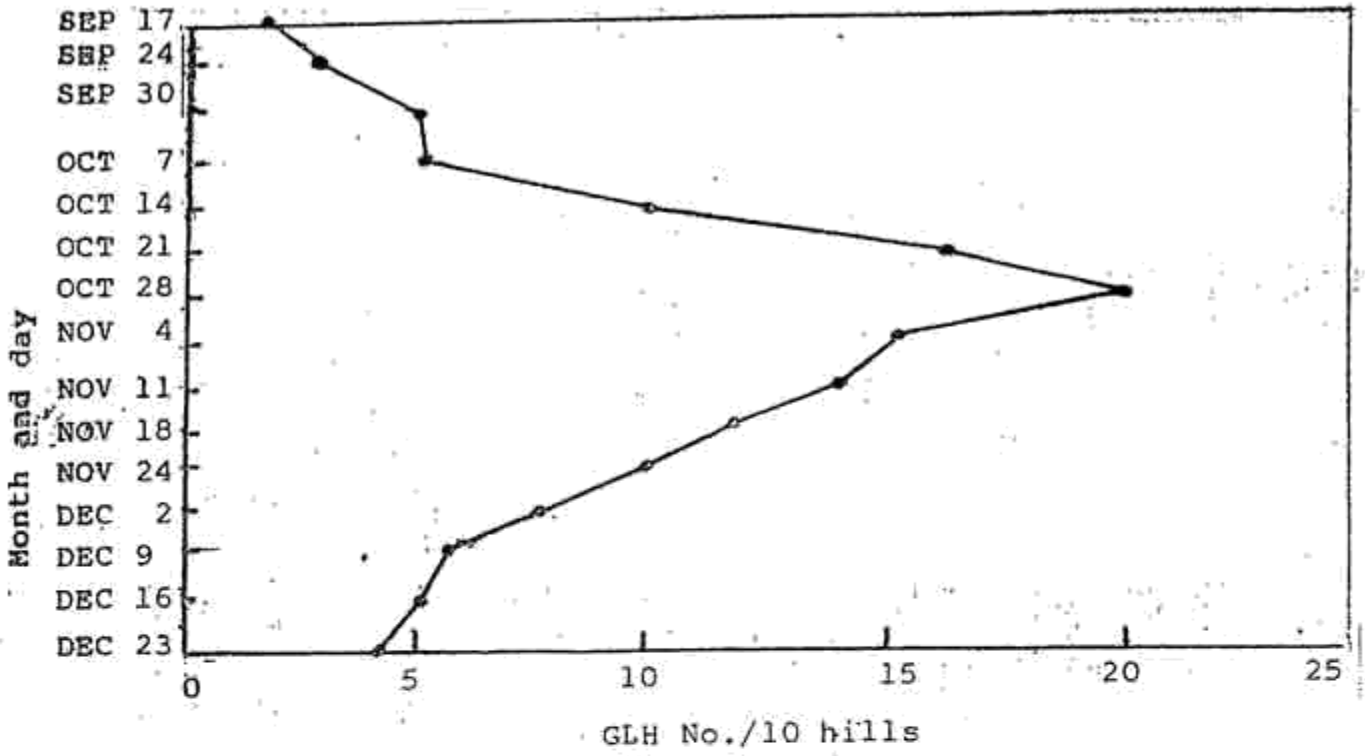

Fig. 3 Seasonal incidence of GLH on ADT 38 - "Early *Samba*"

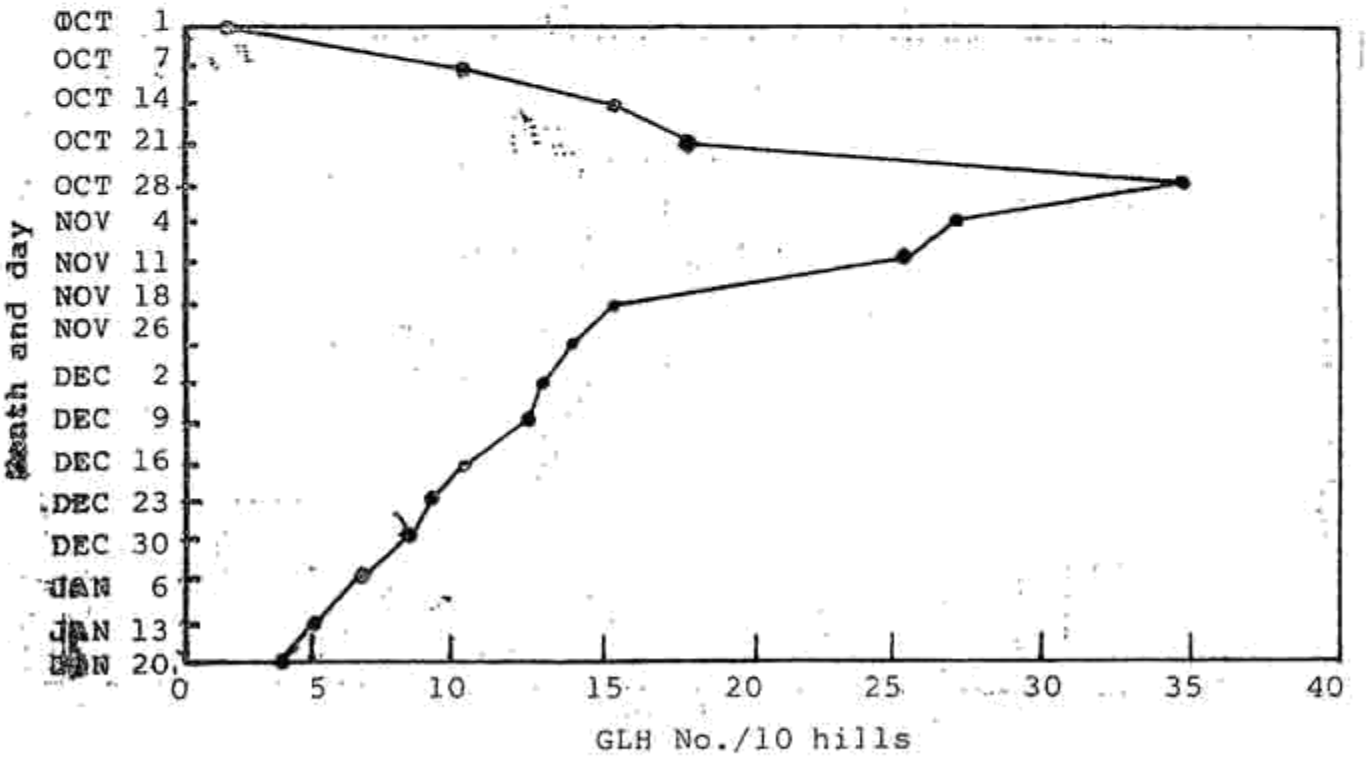

Fig. 4 "Late *Samba*"

Kuruvai crop was seen during the fourth week of August (Fig 1) and on the late planted crop during second week of September (Fig 2). During *samba* in ADT 38, early (September 10th) as well as late (September 25th) planted crop was harbouring GLH population. GLH population attained peak during October fourth week on the early as well as late plantings (Fig.3) during *samba* season. During

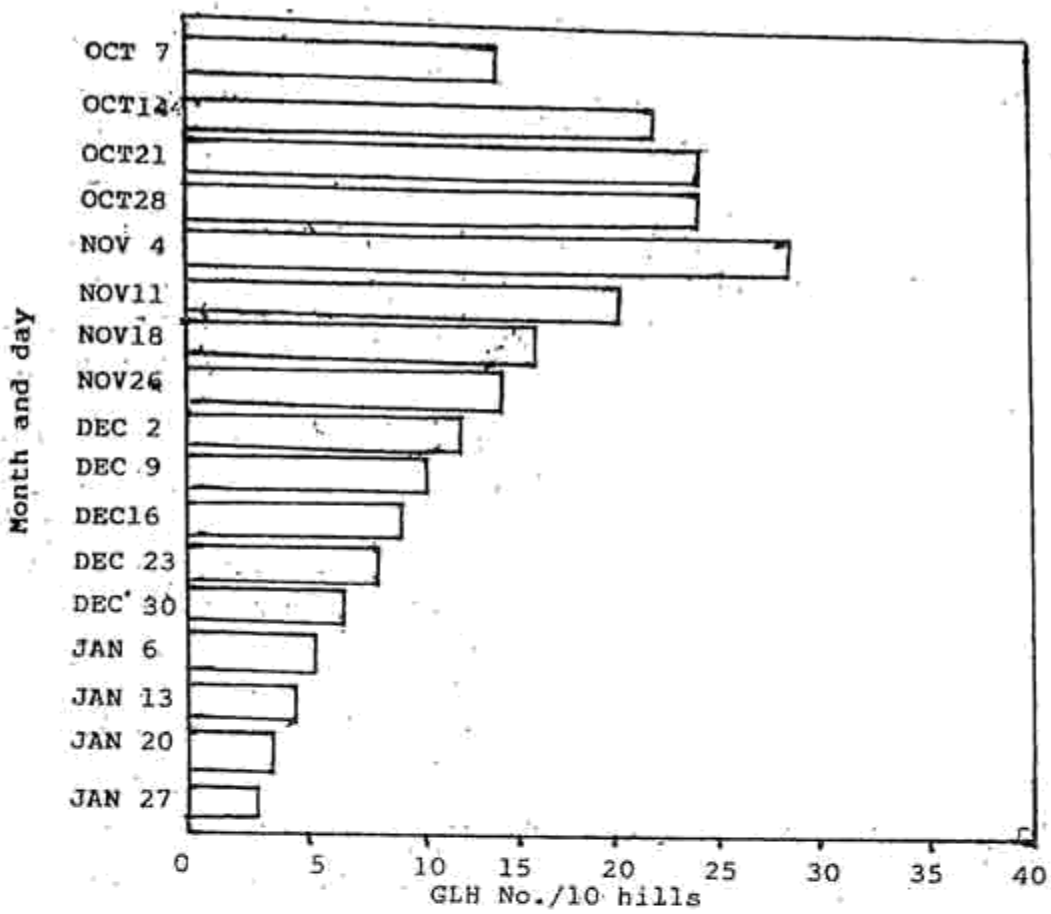

Fig. 5 Seasonal incidence of GLH on ADT 39 - "Early *Samba*"

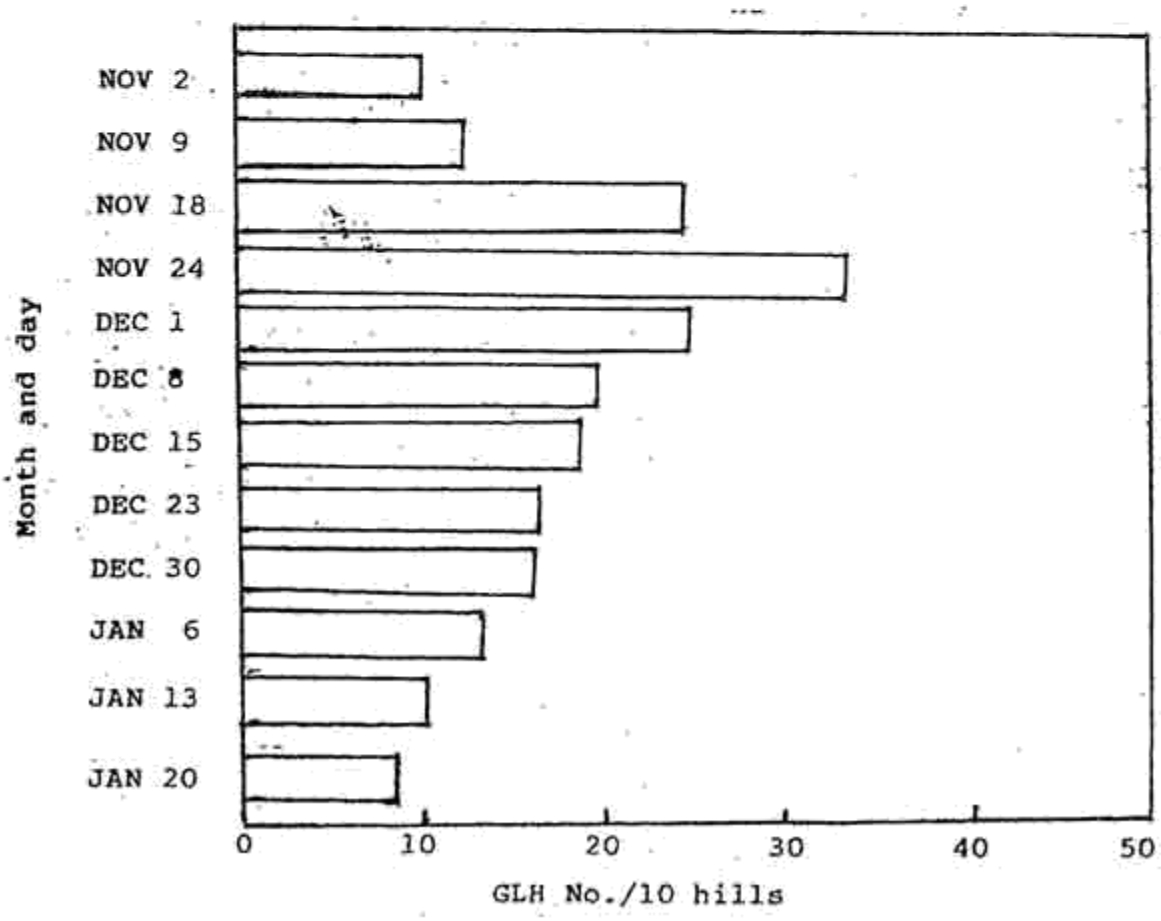

Fig. 6 "Late *Kuruvai*"

thaladi season, ADT 39, early (October 10th) as well as late (October 25th) planted crop was susceptible for GLH. The population attained peak during first week of November in early and fourth week on the late planted crop (Fig 5, 6).

The rice growing seasons are defined and it normally begins from July/August terminates around February/March of the following year. From the ligh-trap catches, it was observed that the peak occurrences coincided with the *samba* and *thaladi* crop in which the GLH populations were high.

Inter-relationship between field and light trap collection

A significant positive correlation existed between the light trap catches and field collections during *kuruvai, samba* and *thaladi*. A regression line fitted for respective seasons were:

$\hat{Y} = 7.5 + 0.034\ x$, $\hat{Y} = -103.38 + 16.99$

For every unit increase in light trap, there was an increase of 0.034 and 16.99 population present in the field for *kuruvai, samba* and *thaladi* seasons respectively. Correlation between the weekly field as well as light trap population was found to be highly significant. The above fact was in line with the findings of Vennila and Sundarababu (1992).

Influence of weather on GLH

The correlation results for GLH populations to agrometerological parameters were positive to relative humidity and maximum temperature and negative to the minimum temperature, sunshine hours and rainfall during *kuruvai* season. During *samba* it was positive to relative humitity and sunshine hours and negative to rest of the parameters. During *thaladi*, it was positive to all the parameters except sunshine was negative (Table 2).

The relative humidity recorded was significant and positive for all the three seasons. Natarajan et al., (1983) and Chelliah and Murugesan, (1985) also reported the positive influence of relative humidity on GLH population.

The multiple regression line fitted for GLH population incidence in the field to the metereological parameters for the three seasons of the zone showed the significant associations. During *kuruvai*, the prediction equation fitted for the above parameters showed the significant influence of GLH populations in the field to about 60 per cent. During *samba* and *thaladi*, the prediction equation fitted for the above 5 weather parameters taking into account with GLH population as dependable variable indicate the positive association to about 65 per cent during *samba* and 76 per cent during *thaladi* season (Table 2).

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