

ANNUAL REPORT (2012-13)
AICRP ON SUGARCANE (ENTOMOLOGY),
Zonal Agricultural Research Station, Powarkheda (M.P.)

Technical Programme 2012-13:

S. No.	Experiments Allotted	C/ NC*
1.	E. 4.1: Evaluation of zonal varieties/genotypes for their reaction against major insect pests	C
2.	E. 28: Survey and surveillance of sugarcane insect pests.	C
3.	E. 30: Monitoring of insect pests and bio-agents in sugarcane agro-ecosystem	C
4.	E. 36: Management of borer complex of sugarcane through lures	C

*C/NC – Conducted/ Not Conducted

E. 4.1: Evaluation of zonal varieties/genotypes for their reaction against major insect pests.

Objective.....: To screen the entries of the zonal varietal trails for their behaviour towards damage caused by key pests in the area

Year of Start: 1985-86 (Continuing)

Experimental details:

Thirteen entries with three checks of early, and twenty entries with two checks of mid-late group were screened for their reaction against infestation of key pests of the area. The infestation of insect pests recorded and the reactions are given in Table - 1 & 2.

Results:

Early group:

Early Shoot Borer (ESB %):

The ESB infestation ranged between 14.25 to 29.73 per cent among various entries screened. Check varieties i.e., Co C 671, Co 85004 and Co 94008 received 18.44, 23.84 and 24.03 per cent ESB infestation, respectively. VSI 08121 least infestation and graded as least susceptible, followed by Co 07015 (18.38%). The Co 09004 (29.73%), Co 09003 (29.31%) and Co 09006 (28.20%) received the higher ESB infestation as compare to the entries.

Table-1: Reaction of different entries (Early group) against early shoot borer, pyrilla, white fly, mealy bug and scale insect, Powarkheda, Madhya Pradesh (2012-13)

	Trial	Entries	ESB (%)	Grade	Pyrilla/leaf	Grade	White fly	Grade	Mealy Bug	Grade	Scale	Grade
1	AVT (E) - I (12-13)	Co 08001	19.07	MS	19.33	MS	3.03	MS	17.78	MS	24.44	MS
2	AVT (E) - I (12-13)	VSI 08121	14.25	LS	19.00	MS	2.20	MS	15.56	MS	8.89	LS
3	AVT (E) - II (12-13)	Co 07012	18.98	MS	33.33	HS	2.43	MS	11.11	MS	15.55	MS
4	AVT (E) - II (12-13)	Co 07015	18.38	MS	18.33	MS	2.47	MS	6.67	MS	11.11	MS
5	AVT (E) - II (12-13)	Co N 07071	22.73	MS	25.67	HS	4.50	MS	17.78	MS	4.44	LS
6	AVT (E) - II (12-13)	PI 07131	19.21	MS	24.67	HS	3.30	MS	2.22	LS	4.45	LS
7	IVT (E) (12-13)	Co 09006	28.20	MS	18.00	MS	1.57	LS	13.33	MS	2.22	LS
8	IVT (E) (12-13)	Co 09007	23.12	MS	22.33	HS	2.63	MS	6.67	MS	20.00	MS
9	IVT (E) (12-13)	Co N 09071	22.65	MS	18.33	MS	1.87	LS	15.56	MS	13.33	MS
10	IVT (E) (12-13)	Co N 09072	21.01	MS	21.00	HS	2.73	MS	8.89	MS	0.00	LS
11	IVT (E) (12-13)	Co 09002	27.60	MS	19.00	MS	3.17	MS	8.89	MS	6.67	LS
12	IVT (E) (12-13)	Co 09003	29.31	MS	23.00	HS	2.43	MS	17.78	MS	0.00	LS
13	IVT (E) (12-13)	Co 09004	29.73	MS	19.00	MS	1.73	LS	6.67	MS	17.78	MS
14	z Check	Co 85004	23.84	MS	26.22	HS	2.81	MS	10.37	MS	14.07	MS
15	z Check	Co 94008	24.03	MS	18.78	MS	1.51	LS	15.55	MS	14.81	MS
16	z Check	Co C 671	18.44	MS	26.67	HS	2.38	MS	7.41	MS	5.19	LS

Pyrilla (per leaf):

Pyrilla population ranged from 18.00 to 33.33 individuals per leaf in various genotypes/ checks evaluated. Eight genotypes graded as moderately susceptible (MS), while others as highly susceptible (HS). The Co 9006, Co N 09071 and Co 07015 received less pyrilla infestation than all three check varieties, while Co 07012 received maximum pyrilla infestation (33.33 pyrilla / leaf).

Whitefly (per square cm leaf area):

Whitefly population ranged from 1.51 to 4.50 per square centimeters leaf area in various early genotypes screened. Three genotypes and Co94008 graded as least susceptible, while others found to be moderately susceptible to white fly. The checks i.e., Co 94008, Co C 671 and Co 85004 received 1.51, 2.38 and 2,81 white fly per square cm leaf area, respectively. Among the various genotypes screened, Co 09006 exhibited the least whitefly infestation. The N 07071, PI 07131, Co 09002 and Co 08001 recorded maximum white fly (more than 3/sq cm leaf area).

Mealy Bug (per cent infested canes):

PI 07131 recorded least susceptible grade, while all others graded as moderately susceptible for mealy bug. Per cent infested canes in genotypes/ varieties evaluated ranged from 2.22 to 17.78. Check varieties, i.e, Co C 671, Co 85004 and Co 94008 received 7.41, 10.37 and 15.55 per cent mealy bug infested canes, respectively. Among genotypes lowest infestation was registered in PI 07131 (2.22 % canes infested), followed by Co 07015 (6.67 % canes infested). Co 09003, Co N 07071 and Co 08001 received the maximum mealy bug infestation (all 17.78 % canes infested).

Scale (per cent infested canes):

Scale infestation ranged from 0.00 to 24.44 per cent in different genotypes/ varieties screened. Seven genotypes and Co C 671 graded as least susceptible (LS). Co N 09072, Co 09003, Co 09006, Co N 07071 and PI 07131 (0.00 to 4.45 % cane infested) received least infestation. Maximum scale infested cane observed in Co 08001 and Co 09007 (more than 20% infested canes).

Mid late group:**Early Shoot Borer (ESB %):**

Early shoot borer infestation (% dead heart) ranged from 7.69 to 22.79 per cent in various entries screened. Four genotypes graded as least susceptible, while others as moderately susceptible (MS). Co 08020, Co 08009 and Co 09012 found less infested genotypes. The check varieties i.e., Co 99004 and Co 86032 received 18.83 and 19.48 per cent ESB infestation. Among the entries, maximum ESB infestation recorded in Co 09009, Co N 09073, Co 07007, Co 09013, Co N 09074 and Co 09014 (above 20 % infestation), these genotypes recorded ESB infestation more than both the check varieties.

Pyrilla (per leaf):

Pyrilla per leaf population varied from 12.67 to 34.00 individuals per leaf in different genotypes/ varieties evaluated. Twelve genotypes and both checks graded as moderately susceptible, while rest eight genotypes graded as highly susceptible to pyrilla. All Twelve genotypes (MS) received less pyrilla infestation (12.67 to 19.45 individuals/ leaf) than the both checks i.e., Co 86032 and Co 99004 (19.45 and 19.60 individuals/ leaf). Co Snk 08101 and Co 08016 both were the maximum pyrilla infested genotypes as they recorded more than 30 pyrilla individuals per leaf.

Whitefly (per square cm leaf area):

Midlate genotypes received whitefly population from 1.40 to 5.00 per square cm leaf area. Co 08009, Co N 09074 and Co 07006 (1.40 to 1.73 per square cm leaf area) received the least white fly infestation and graded as least susceptible genotypes, while rest reacted as moderately susceptible to white fly infestation. The checks i.e., Co 99004 and Co 86032 registered 2.27 and 2.30 individuals per square cm leaf area. The Co 08008, Co 07010 and Co Snk 08101 received maximum whitefly population (5.00, 4.63 and 4.23 individuals/sq cm leaf area, respectively).

Mealy Bug (per cent canes infested):

In midlate genotypes/ varieties screened, the mealy bug infested canes ranged between 2.22 to 22.22 per cent. Co 07010, Co 02040 and Co 07006 (2.22 to 4.45 % cane infested) recorded as least susceptible, while others including both the checks as moderately susceptible reaction to mealy bug. Co 08020 (22.22 % canes infested) received the maximum infestation, followed by the Co N 09073 (20.00% canes infested).

Table-2: Reaction of different entries (Midlate group) against early shoot borer, Pyrilla, white fly, mealy bug and scale insect, Powarkheda, Madhya Pradesh (2012-13)

S.No.	Trial	Entries	ESB (%)	Grade	Pyrilla/ leaf	Grade	White fly	Grade	Mealy Bug	Grade	Scale	Grade
1	AVT (ML)-I (12-13)	Co 08008	15.51	MS	26.00	HS	5.00	MS	11.11	MS	15.55	MS
2	AVT (ML)-I (12-13)	Co 08009	9.57	LS	28.33	HS	1.40	LS	8.89	MS	8.89	LS
3	AVT (ML)-I (12-13)	Co 08016	16.92	MS	33.00	HS	3.33	MS	15.55	MS	15.55	MS
4	AVT (ML)-I (12-13)	Co 08020	7.69	LS	25.67	HS	3.60	MS	22.22	MS	6.67	LS
5	AVT (ML)-I (12-13)	Co Snk 08101	15.29	MS	34.00	HS	4.23	MS	15.56	MS	17.78	MS
6	AVT (ML)-II (12-13)	Co 07006	15.99	MS	20.67	HS	1.73	LS	4.45	LS	0.00	LS
7	AVT (ML)-II (12-13)	Co 07007	21.28	MS	19.33	MS	2.37	MS	8.89	MS	17.78	MS
8	AVT (ML)-II (12-13)	Co 07008	13.49	LS	25.33	HS	3.60	MS	11.11	MS	0.00	LS
9	AVT (ML)-II (12-13)	Co 07009	16.72	MS	17.00	MS	2.20	MS	6.67	MS	8.89	LS
10	AVT (ML)-II (12-13)	Co 07010	17.07	MS	17.33	MS	4.63	MS	2.22	LS	2.22	LS

Continue

S.No.	Trial	Entries	ESB (%)	Grade	Pyrilla/ leaf	Grade	White fly	Grade	Mealy Bug	Grade	Scale	Grade
11	AVT (ML)-II (12-13)	Co Snk 07103	17.56	MS	17.00	MS	3.77	MS	13.33	MS	13.33	MS
12	IVT (ML) (12-13)	Co 09009	22.79	MS	19.67	MS	3.20	MS	11.11	MS	8.89	LS
13	IVT (ML) (12-13)	Co 09010	18.63	MS	12.67	MS	2.40	MS	11.11	MS	6.67	LS
14	IVT (ML) (12-13)	Co 09012	11.83	LS	18.67	MS	2.30	MS	11.11	MS	15.55	MS
15	IVT (ML) (12-13)	Co 09013	21.04	MS	16.67	MS	2.17	MS	11.11	MS	6.67	LS
16	IVT (ML) (12-13)	Co 09014	20.16	MS	16.33	MS	2.17	MS	11.11	MS	8.89	LS
17	IVT (ML) (12-13)	Co 02040	16.73	MS	19.00	MS	3.27	MS	2.22	LS	11.11	MS
18	IVT (ML) (12-13)	Co N 09073	21.43	MS	19.00	MS	2.63	MS	20.00	MS	4.44	LS
19	IVT (ML) (12-13)	Co N 09074	20.69	MS	17.67	MS	1.73	LS	6.67	MS	8.89	LS
20	IVT (ML) (12-13)	Co Snk 05102	16.33	MS	21.67	HS	2.73	MS	8.89	MS	11.11	MS
21	z Check	Co 86032	19.48	MS	19.45	MS	2.36	MS	11.85	MS	8.15	LS
22	z Check	Co 99004	18.83	MS	19.60	MS	2.27	MS	9.14	MS	9.38	LS

Scale (per cent infested canes):

Scale infestation ranged from 0.00 to 17.78 per cent in different entries screened. Twelve genotypes and both the checks graded as least susceptible, while other as moderately susceptible. Co 07006, Co 07008, Co 07010 and Co N 09073 infested less than five per cent (0.00 to 4.44 % cane infested). Maximum scale infestation observed in Co 07007 and Co Snk 0810 (both 17.78%).

E. 28: Survey and surveillance of sugarcane insect pests.

Objectives: To identify key insect pests of sugarcane in the area.

Duration : Long term.

Year of Start: 2003-04

Experimental Details:

The Hoshangabad, Bankhedi, Narsinghpur and Betul sugarcane growing area was surveyed for the purpose of recording the sugarcane insect pests and their natural enemies

Results:

Different sugarcane growing area surveyed, insect pests observed with variety, infestation level recorded and any other important information (remark) if any, is given in Table no. 3. Some important observations emerged are given under –

1. The Co J 64 is the ruling variety, except Betul where Co 62175 is the ruling one. Other varieties contributed 20-30% area. The Co 86032 is now Co 99004,
2. In area, early shoot borer and pyrilla is major while root borer, scale, whitefly and mealy bug are the minor insect pests infesting sugarcane.
3. Early shoot borer infestation remained up to 11 to 19, 8 to 19, 9 to 18 and 8 to 15 per cent in various varieties at Hoshangabad, Bankhedi, Narsinghpur and Betul. No bio agent activity observed against early shoot borer.
4. Severe infestation of pyrilla observed in almost all the sugarcane growing areas, resulted in yellowing of leaves and sooty mould coverage up to 80 per cent.
5. Delayed activity of *Epiricania* observed, which controlled the pyrilla by end of September in about all areas.
6. This may be because of comparative low minimum temperature during 1st phase.
7. Infestation of root borer at Bankhedi, Woolly aphid at Betul and scale insect (more in ratoons of old varieties) and white fly (more in water logged conditions) also observed.

Table: 3. Occurrence of naturally occurring insect pests on sugarcane

S. No.	Area	Insect pest	Variety	Infestation level	Remark
1.	Hoshangabad	ESB	Co 86032	16	No bio-agent observed
			Co JN 86-600	12	
			Co 99004	19	
			Co JN 86 141	11	
			Co C 671	14	
		Range		11-19%	
		Pyrilla/ Leaf	Co 86032	19	<i>Tetrastichus</i> & <i>Epiricania</i> working effectively
			Co JN 86-600	18	
			Co 99004	20	
Co JN 86 141	15				
Co C 671	23				
Range		15 - 23			
Whitefly	Traces				
Scale (% cane infested)	Co 86032	12%			
	Co JN 86-600	3%			
	Co 99004	<2%			
	Co JN 86 141	Traces			
	Co C 671	Traces			
Root Borer	Traces				
2.	Bankhedhi	ESB	Co J 64	8-12	No activity of any bio agent observed
			Co 94008	8	
			Co 86032	16	
			Co 92005	19	
			Range		
		Pyrilla	Co J 64	19	<i>Tetrastichus</i> & <i>Epiricania</i> working effectively
Co 94008	11				
Co 86032	21				
Co 92005	18				
Range			11 to 21		
Root borer	Co J 64 Co 94008 Co 86032 Co 92005	Varies from 3 to 11 per cent	In root borer affected fields wilt also observed		
3.	Narsinghpur (Kareli)	Pyrilla	Co J 64	20	The <i>Epiricania</i> appeared late in rainy season
			Co S 88230	25	
			Co Lk 8001	15	
		Range		15 to 25	
		ESB (%)	Co J 64	10	
Co 88230	18				
Co Lk 8001	9				
Range		9 to 18			
Scale	Traces	< 2% observed in Co 88230, Co 64, Co 86032 & Co C 671			

Continue.....

S. No.	Area	Insect pest	Variety	Infestation level	Remark	
1.	Betul	ESB (%)	Co 86032 Co 62175 Co 7318 Co 678 Co C 671	13 15 8 11 8	No activity of any bio agent observed	
		Over all		8-15		
		Pyrilla (per leaf)	Co 86032 Co 62175 Co 7318 Co 678 Co C 671)	19 11 8 22 16	<i>Tetrastichus</i> & <i>Epiricania</i> working effectively	
		Range		8-22		
		Scale insect (% cane infested)	Co 86032 Co 62175 Co 7318 Co 619 Co C 671 Belapuri (Local)	8 4 6 12 3 4	Observed in some fields especially in ratoon crop	
		Range		3-12		
		Woolly aphid in traces on Co 678, Belapuri (Local) & Co 62175				
		Whitefly & Top shoot borer: In traces; White fly infestation observed only in water stagnation area. The top shoot borer (3-7%) observed on Co 62175.				

E. 30: Monitoring of Insect Pests and their Bio-agents in Sugarcane Agro-ecosystem.

Objectives: To monitor the key insect pests and their natural enemies of sugarcane in the area.

Year of start: 2006-07 Variety: Co 86032 Area: 0.2 ha

Experimental Details:

Sugarcane variety, Co 86032 was planted in 0.2 ha area for the study and all recommended package of practices were followed except application of insecticides. At each Standard meteorological week (SMW) the observations on infestation of both key pests i.e., early shoot borer and pyrilla and their natural enemies were recorded. Data regarding meteorological parameters were obtained from Agro-Meteorological Project, ZARS, Powarkheda. (Table 4 to 7 & Fig. 1 to 4).

RESULT:

In the season, cumulative infestation of early shoot borer remained 25.2 per cent. The infestation initiated at 2nd week of February. Infestation gradually increased

and peak activity observed from 13th to 17th SMW during April (more than 2.5%/week). Afterwards the borer observed a decline trend and continued till 24th SMW. During the season, no activity of bio agent was observed on early shoot borer. During the peak activity period the maximum & minimum temperature and relative humidity ranged from 41 to 42^oC, 15 to 21^oC and 58 to 78 per cent, respectively.

Table 4: Activity of Early Shoot Borer and meteorological data, 2012, ZARS, Powarkheda (M.P.)

SMW	Date (2011)	Max. Temp. (°C)	Min. Temp (°C)	RH%	Rainfall (mm)	ESB infestation (%)	
						Weekly	Cumulative
5	29/1 to 4/2	24	8	96	2.0	0.00	0.0
6	5 to 11/2	27	6	88	0.0	0.40	0.4
7	12 to 18/2	27	7	89	0.0	0.00	0.4
8	19 to 25/2	31	11	89	0.0	0.20	0.6
9	26/2 to 4/3	31	11	84	0.0	0.60	1.2
10	5 to 11/3	32	10	89	0.0	1.00	2.2
11	12 to 18/3	35	11	78	0.0	1.00	3.2
12	19 to 25/3	37	12	71	0.0	1.40	4.6
13	26/3 to 1/4	42	15	68	0.0	2.60	7.2
14	2 to 8/4	42	18	78	0.0	3.00	10.2
15	9 to 15/4	42	20	71	0.0	3.20	13.4
16	16 to 22/4	41	21	75	0.0	3.40	16.8
17	23 to 29/4	42	21	58	0.0	2.80	19.6
18	30/4 to 6/5	40	22	73	6.2	1.60	21.2
19	7 to 13/5	42	23	69	16.4	1.80	23.0
20	14 to 20/5	43	25	62	0.0	1.00	24.0
21	21 to 27/5	44.7	27	48	0.0	0.40	24.4
22	28/5 to 3/6	45	29.5	56	0.0	0.20	24.6
23	4 to 10/6	39.9	26	70	6.6	0.40	25.0
24	11 to 17/6	39.8	24	84	45.6	0.20	25.2
25	18 to 24/6	37.7	22.6	90	14.8	0.00	25.2
26	25/6 to 1/7	40.9	26	98	36.6	0.00	25.2

Pyrilla:

This year, severe infestation of pyrilla observed i.e., 15 pyrilla per leaf at 1st phase in 15th SMW and 25.60 pyrilla per leaf at 2nd phase in 36th SMW. This year minimum temperature remained less than 12^oC up to March i.e., 3.8^oC, 3.3^oC and 3.5^oC less than the average minimum temperature of last 20 years (1911-2011; Table-7 & fig. 3). Lower minimum temperature contributes better crop growth and survival of pyrilla during 1st phase, which leads to fast and severe pyrilla population built-up during 2nd phase.

In 1st phase, the pyrilla infestation initiated at 10th SMW (2nd week of March), reached to its peak at 15th SMW (3rd week of April) and remained active up to 21st SMW (4th week of May). Egg parasite, *Tetrastichus Pyrillae* up to 55.88 per cent and *Epiricania malanoleuca* up to 5.33 live cocoons per leaf also observed.

Table 5: Seasonal incidence of pyrilla and its bio-agents and meteorological data (Summer-2012), ZARS, Powarkheda (M.P.).

Standard WEEK	Date (2011)	Max. Temp . (°C)	Min. Temp (°C)	RH%	Rainfall (mm)	Pyrilla/leaf	<i>Tetrastichu</i> <i>s</i> (%)	<i>Epiricania</i> /leaf
10	5 to 11/3	32	10	89	0.0	0.53	0.00	0.00
11	12 to 18/3	35	11	78	0.0	13.00	0.84	0.00
12	19 to 25/3	37	12	71	0.0	14.67	2.20	0.00
13	26/3 to 1/4	42	15	68	0.0	17.00	8.60	1.47
14	2 to 8/4	42	18	78	0.0	14.00	16.76	2.54
15	9 to 15/4	42	20	71	0.0	15.00	34.36	5.33
16	16 to 22/4	41	21	75	0.0	12.33	46.76	4.60
17	23 to 29/4	42	21	58	0.0	11.66	55.88	3.80
18	30/4 to 6/5	40	22	73	6.2	8.33	23.44	2.53
19	7 to 13/5	42	23	69	16.4	7.00	7.00	1.67
20	14 to 20/5	43	25	62	0.0	1.27	2.04	0.27
21	21 to 27/5	44.7	27	48	0.0	0.53	0.00	0.00

In 2nd phase, pyrilla infestation observed from 26th SMW (last week of June). The activity of *Tetrastichus pyrillae* and the *Epiricania melanoleuca* started after one and two weeks of pyrilla appearance. Than after, infestation of pyrilla as well as of the both bio-control agents gradually increased. The pyrilla and *Tetrastichus pyrillae* reached to peak at 36th SMW (25.60 individuals and 81.16 per cent, respectively), while *Epiricania malanoleuca* observed its peak activity at 37th SMW. The pyrilla and *Epiricania* remained active up to 39th SMW, while *Tetrastichus* up to 40th SMW. Maximum temperature of $31 \pm 3^{\circ}\text{C}$, minimum temperature of 23°C and 98 to 100 per cent RH seems to be favourable for peak activity of pyrilla.

Table 6: Activity of pyrilla and its bio agents in rainy season with meteorological data, 2012 at ZARS, Powarkheda (M.P.).

Standard WEEK	Date (2011)	Max. Temp. (°C)	Min. Temp (°C)	RH%	Rainfall (mm)	Pyrilla/ leaf	<i>Tetrastichus</i> (%)	<i>Epiricania/ leaf</i>
24	18 to 24/6	39.8	24.0	84	45.6	0.00	0.00	0.00
25	25/6 to 1/7	37.7	22.6	90	14.8	0.00	0.00	0.00
26	25/6 to 1/7	40.9	26.0	98	36.6	1.47	0.00	0.00
27	2 to 8/7	37.2	23.5	98	47.2	3.47	7.80	0.00
28	9 to 15/7	33.8	23.4	98	62.8	6.87	17.60	0.80
29	16 to 22/7	34.3	24.0	96	32.4	10.13	31.60	2.73
30	23 to 29/7	29.2	21.6	100	568.1	6.73	23.56	2.33
31	30/7 to 5/8	28.5	21.0	98	105.5	13.53	37.72	2.73
32	6 to 12/8	27.6	23.0	100	285.6	17.27	57.84	3.07
33	13 to 19/8	29.0	16.1	90	28.0	20.00	62.12	5.67
34	20 to 26/8	31.5	23.0	99	83.6	21.93	67.60	7.47
35	27/8 to 2/9	34.7	23.0	99	19.4	22.67	74.68	9.53
36	3 to 9/9	34.3	23.1	98	73.6	25.60	81.16	12.53
37	10 to 16/9	32.9	23.2	98	72.0	15.60	51.84	14.87
38	17 to 23/9	34.0	22.7	92	0.0	4.80	28.24	6.27
39	24 to 30/9	34.4	22.2	92	31.2	1.13	10.72	1.93
40	1 to 7/10	35.6	21.0	75	0.0	0.00	0.52	0.00
41	8 to 14/10	34.8	18.0	64	0.0	0.00	0.00	0.00

Table 7: Month wise average minimum temperature (2012), average minimum temperature of last 20 years (1992- 2011) and deviation (+/-)

Months	Average Min Temp 2012 (A)	Average Min Temp (1991-2011) (B)	Deviation of (A) from (B)
January	6.3	10.0	-3.8
February	8.0	11.2	-3.3
March	11.8	15.3	-3.5
April	20.0	21.0	-1.0
May	25.3	26.5	-1.2
June	24.7	26.3	-1.7
July	23.1	24.9	-1.8
August	21.2	24.4	-3.2
September	22.8	23.9	-1.1
October	18.6	18.8	-0.3
November	13.4	14.6	-1.1
December	10.9	11.8	-1.0

Fig.1: Seasonal Incidence of Early Shoot Borer & Meteorological Data (2012), ZARS, Powarkheda (M.P.)

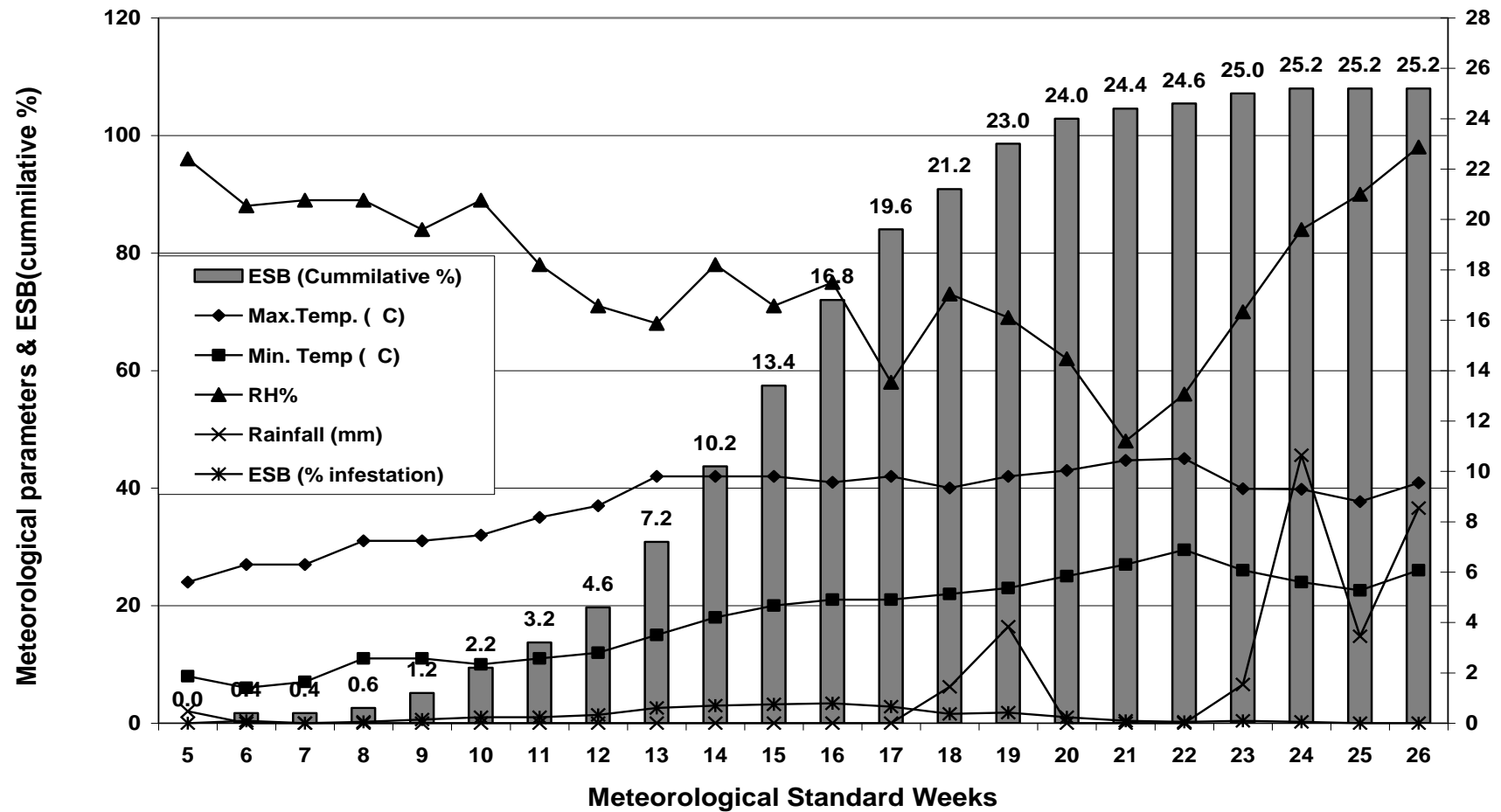


Fig. 2: Seasonal incidence of Pyrilla & Its natural enemies with Meteorological parameters (2012), ZARS, Powarkheda (M.P.)

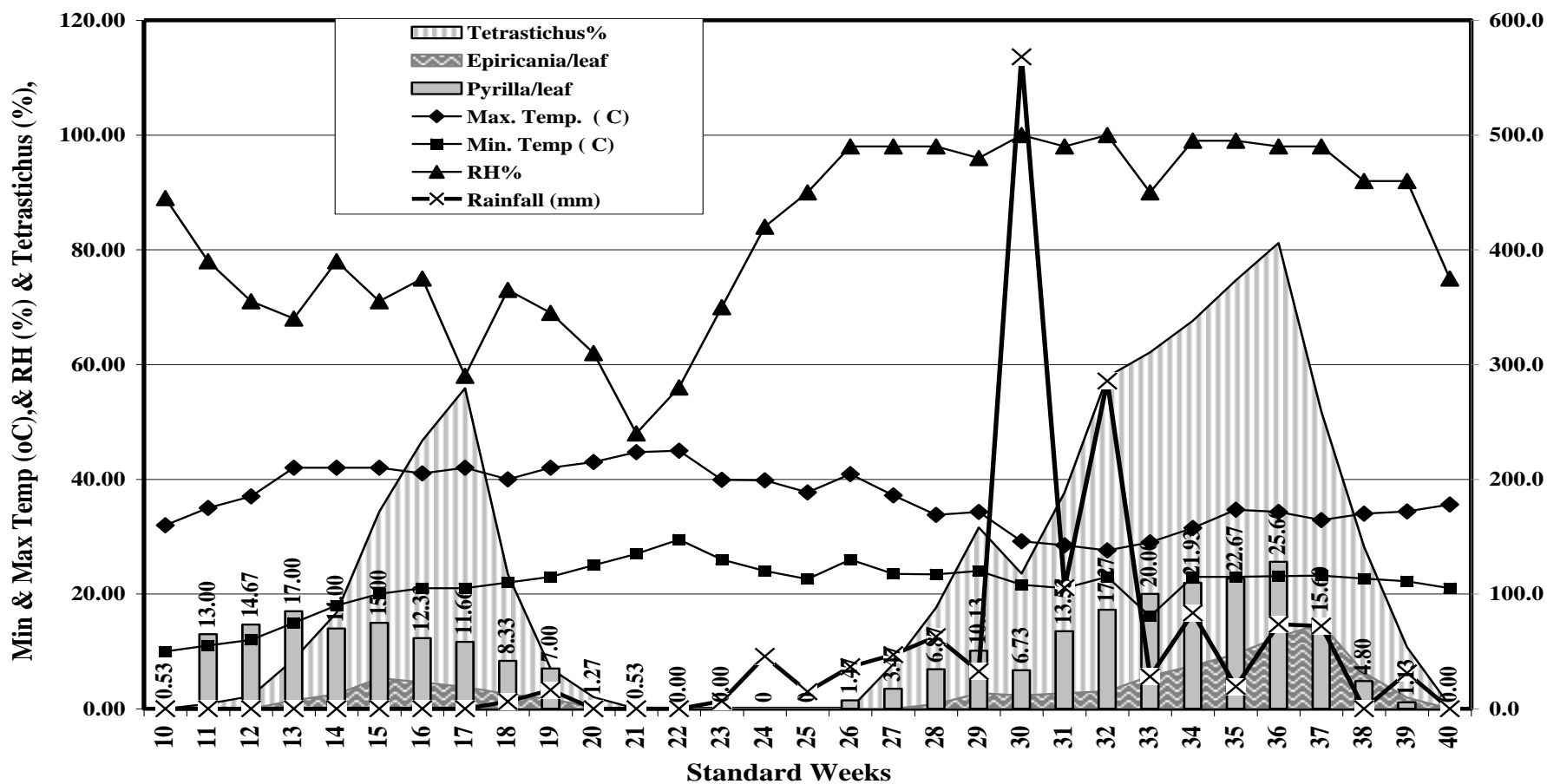
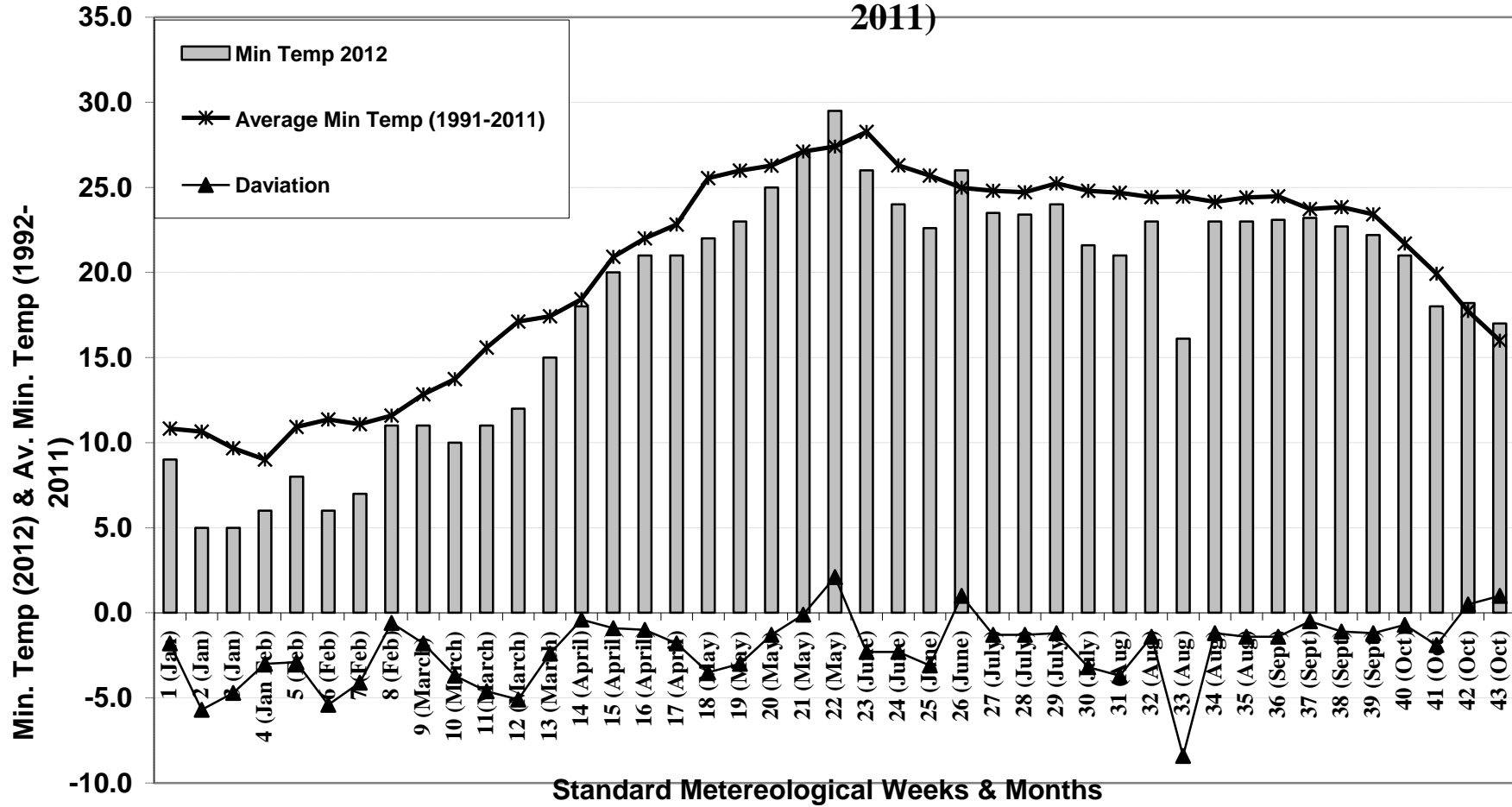
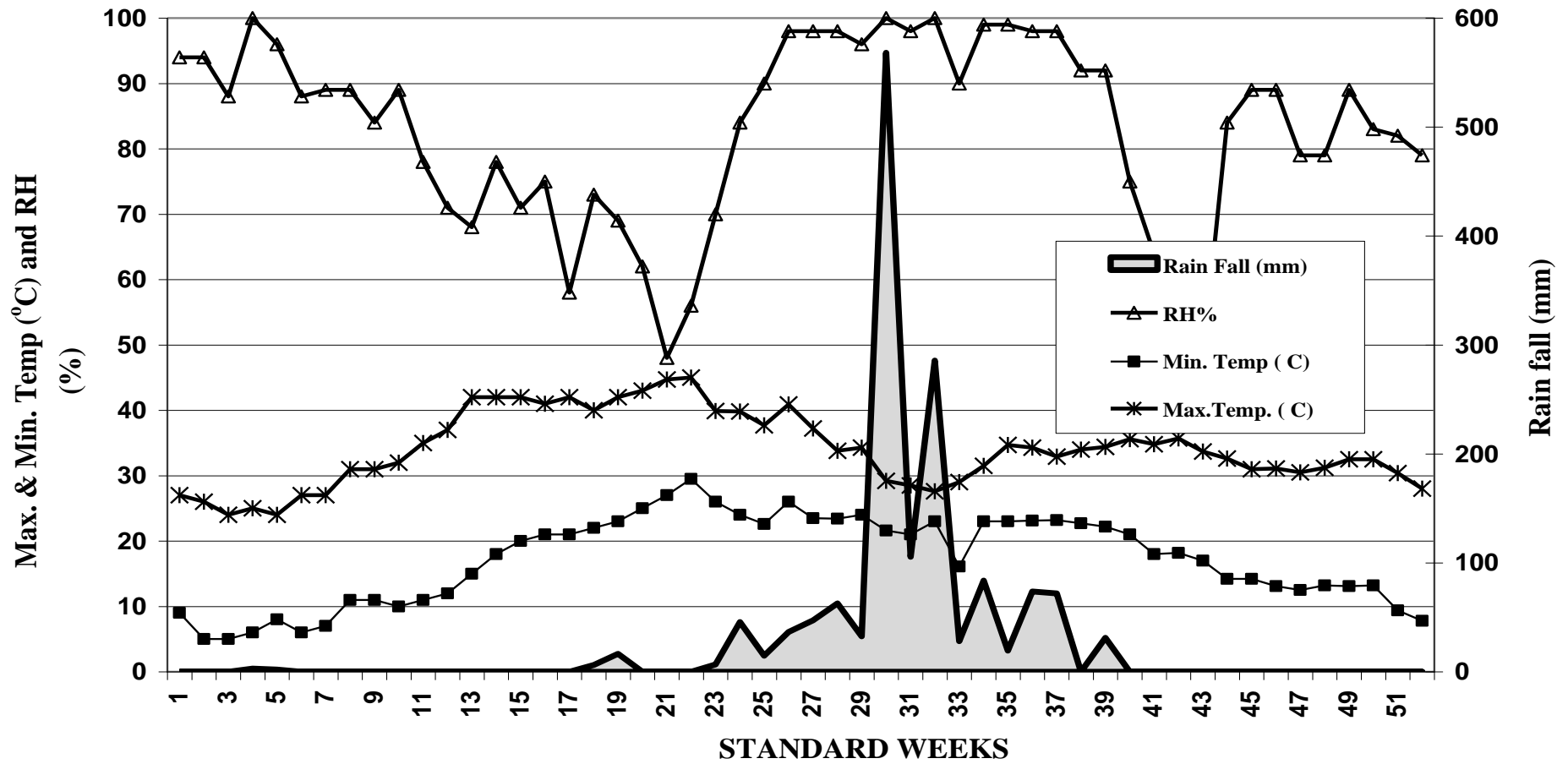


Fig. 3: Minimum Temperature 2012 v/s Average minimum temperature (1992-2011)



**Fig. 4: METEOREOLOGICAL SITUATIONS DURING 2012,
ZARS, POWARKHEDA (M. P.)**



Project E.36: Management of borer complex of sugarcane through lures

Objective : To manage sugarcane borers (early shoot borer, top borer, internode borer and stalk borer) through pheromone traps

Year of Start: 2012-2013 **Variety:** Co 86032

Methodology:

The Co 86032 sown in two separate blocks i.e. in first one early shoot borer pheromone traps installed, while second one kept as control. Observations recorded on early shoot borer infestation at both the blocks and captures of early shoot borer moth daily. The moth captured per day at each standard meteorological week calculated. The correlation and regression was also worked out in-between the average moths captures with the meteorological parameters and presented in table no.8

Result:

During the season, early shoot borer (ESB), dead hearts observed from 7th standard meteorological week (SMW) i.e., first week of February, in the same week the first ESB moth capture also recorded. Maximum ESB infestation as well as the moth captures at pheromone trap was observed from 12th to 18th SMW i.e., April and May. The cumulative ESB infestation in the control block remained 27.20 per cent, while it was 22.60 per cent in lure managed block i.e., 4.60 per cent lower as compared to control block.

The correlation and regression of the meteorological parameters with the number of moth captured per day per SMW was also worked out. The Correlation values is 0.501, 0.286, -0.371 and -0.192 for maximum temperature, minimum temperature, relative humidity and quantum of rain, respectively.

Table -8 : Meteorological Parameters, per cent Early shoot borer infestation of Lure managed V/S Control Block & Moth captured per day per Pheromone Trap at various Meteorological Weeks, ZARS, Powarkheda (2012).

2012	Meteorological Parameters					ESB (% infestation)			Moth Captures/ day/trap
Date From To	STD Weeks	Max.Temp. (C)	Min. Temp (C)	RH%	Rainfall (mm)	Control Block	Lure Managed Block	Difference Over Control (+/-)	
19 to 25/2	6	27	6	88	0.0	0.00	0.00	0.00	0.00
26/2 to 4/3	7	27	7	89	0.0	0.20	0.20	0.00	0.07
5 to 11/3	8	31	11	89	0.0	0.40	0.20	-0.20	0.14
12 to 18/3	9	31	11	84	0.0	0.80	1.00	0.20	0.29
19 to 25/3	10	32	10	89	0.0	1.00	0.80	-0.20	0.14
26/3 to 1/4	11	35	11	78	0.0	1.40	1.20	-0.20	0.14
2 to 8/4	12	37	12	71	0.0	2.40	1.80	-0.60	0.21
9 to 15/4	13	42	15	68	0.0	3.00	2.60	-0.40	0.36
16 to 22/4	14	42	18	78	0.0	3.00	2.40	-0.60	0.64
23 to 29/4	15	42	20	71	0.0	3.40	2.80	-0.60	0.57
30/4 to 6/5	16	41	21	75	0.0	3.60	3.00	-0.60	0.71
7 to 13/5	17	42	21	58	0.0	2.40	2.00	-0.40	0.71
14 to 20/5	18	40	22	73	6.2	2.00	1.60	-0.40	0.79
21 to 27/5	19	42	23	69	16.4	1.40	1.00	-0.40	0.50
28/5 to 3/6	20	43	25	62	0.0	0.60	0.40	-0.20	0.29
4 to 10/6	21	44.7	27	48	0.0	0.40	0.60	0.20	0.21
11 to 17/6	22	45	29.5	56	0.0	0.40	0.40	0.00	0.14
18 to 24/6	23	39.9	26	70	6.6	0.60	0.40	-0.20	0.21
25/6 to 1/7	24	39.8	24	84	45.6	0.20	0.20	0.00	0.07
2 to 8/7	25	37.7	22.6	90	14.8	0.00	0.00	0.00	0.00
Total						27.20	22.60	-4.60	