Lithuanian Research Centre for Agriculture and Forestry
Institute of Horticulture

Monitoring sawfly populations in plum and apple orchards using visual traps

R. Tamosiunas, L. Duchovskiene, A. Valiuskaite

Apple sawfly (*Hoplocampa testudinea* Klug.)

- **Common and widespread pest in all apple growing areas in Europe and North America.**
- **Apple sawfly problems have been repeatdly reported from UK and all parts of continental Europe.**
- **In years when fruit setting is low or sawfly infestation is high, yield losses often exceeds the damage caused by codling moth (*Cydia pomonella* L.) – a major pest of apples.**
- **Control tactics rely on one or two insecticide treatments before bloom and during petal fall.**

Apple sawfly

- **It is an univoltine species with one generation per season, and most of its life-cycle is spent in the soil in the form of overwintering larva.**
- **Often, large parts of sawfly populations remain in prolonged diapause for two or three winters and for that reason sawfly populations reach high densities very unregularly.**
- **Sawfly females ovisposits only into calyxes of opening blossoms, so coincidence between peak flight activity and certain flowering phase influence possible damage.**
- **Apple sawfly populations are needed to be monitored, in order to predict possible damage and to make decisions about controll measures.**
- **Pest monitoring, along with damage and action thresholds and prediction models is very important part of IPM.**

Apple sawfly

Black (*H. minuta* Christ.) and yellow (*H. flava* L.) plum sawflies

- **Black plum sawfly is one of the most serious plum pests.**
- **Both species together are even more destructive and according to some sources can reduce plum yield up to 90%.**
- **Biology and ecology is very similar to apple sawfly.**
- **Control of these pests also relies on use of insecticides, but IPM approach is needed.**

Black and yellow plum sawflies

Goal

- **The goal of this study was to monitor apple and plum sawfly populations using white sticky traps in order to predict spring emergence as well as to estimate main population parameters and infestation levels in Lithuanian conditions.**

Materials and Methods

- **The study was performed at experimental apple and plum orchards of Institute of Horticulture (Lithuanian Research Centre for Agriculture and Forestry) in Central Lithuania.**
- **The study was conducted for two consecutive seasons from 2010 to 2011.**
- **Apple sawfly populations were investigated in two differently managed apple orchards – conventional (13 ha) and organic (0,5 ha).**
- **Plum sawfly populations were surveyed in plum orchard, cultivar 'Stanley'.**

Materials and Methods

- **The following apple varieties were surveyed in conventional orchard: 'Auksis', 'Lobo', 'Lodel, 'Alva, 'Connell Red, 'Spartan', 'Noris'; 'Ligol', 'Delikates' majority grafted on rootstock M26.**
- Cultivars surveyed in organically managed orchard: **'Aldas', 'Rubinola', 'Vitos', 'Lodel', 'Rajka', 'Enterprise' and hybrid No. 18501 all grafted on rootstock B396.**
- **White sticky traps Rebell® bianco (Andermatt Biocontrol, Switzerland) were used to monitor sawfly flight activity and population density.**
- **Overall 40 and 28 traps were installed in conventional and organic orchards and 5 traps in plum orchard and equally distributed throughout the cultivars.**
- **Inspections were carried out in 2-5 days intervals.**

Materials and Methods

- **Temperature sums were calculated using minimum and maximum daily soil temperatures (in 10 cm depth), lower threshold of 4°C was used.**
- **Meteorological data was acquired from meteo-station iMetos (Pessl Instruments, Austria), located 0,5-0,7 km from the experimental sites.**

White sticky trap Rebell®bianco

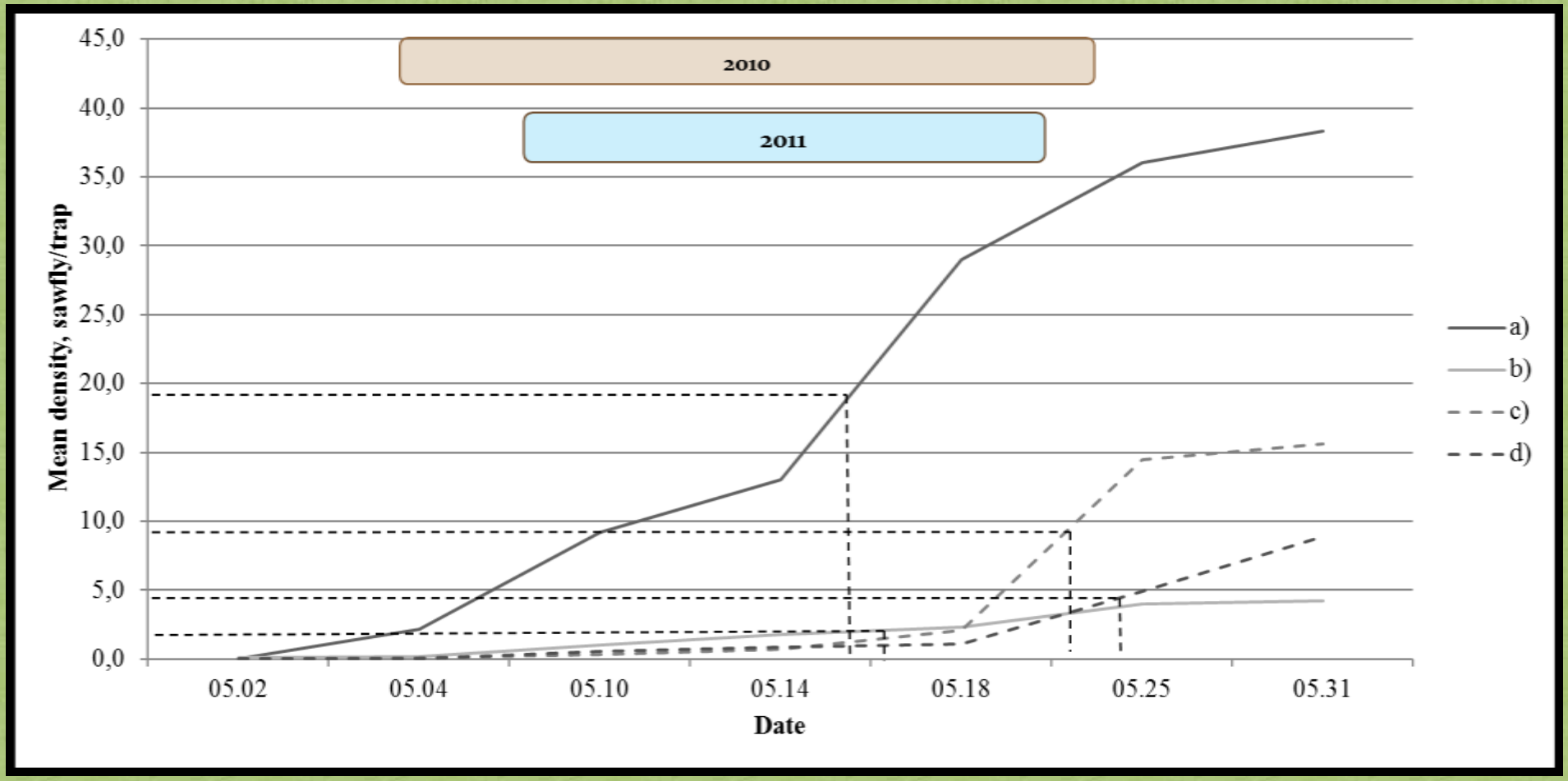
Results

Temperature sum accumulation

Year	Organic				Conventional			
	Emer-gence	25%	50%	75%	Emer-gence	25%	50%	75%
2010	123	161	210	251	123	284	315	328
2011	116	158	222	266	134	281	318	341
Total±SD	120±5	**160±2**	**216±8**	**259±11**	129±8	**283±2**	**317±2**	**335±9**

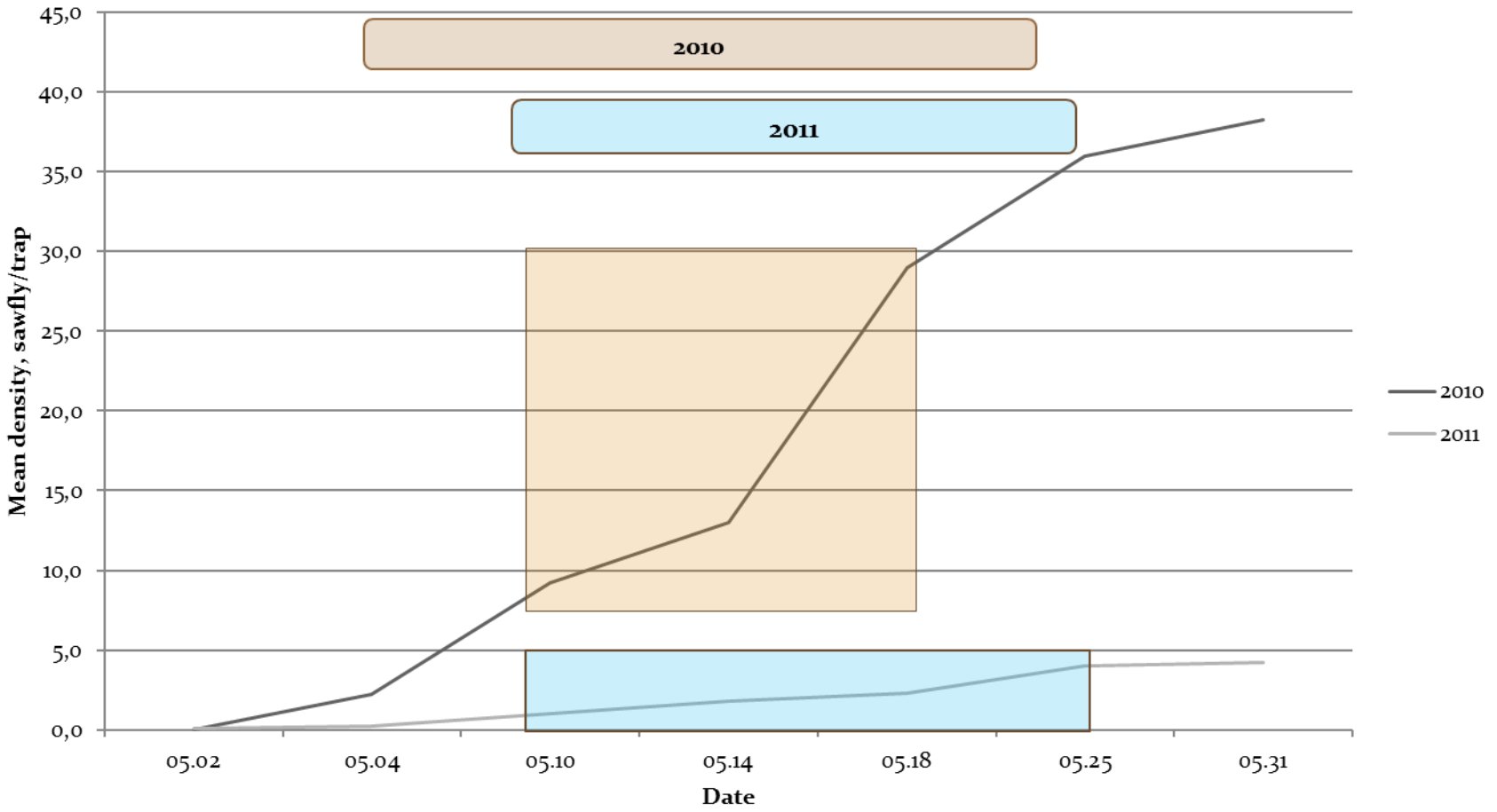
Sum of effective temperatures is expressed as degree-days

Cumulative mean density and flowering period

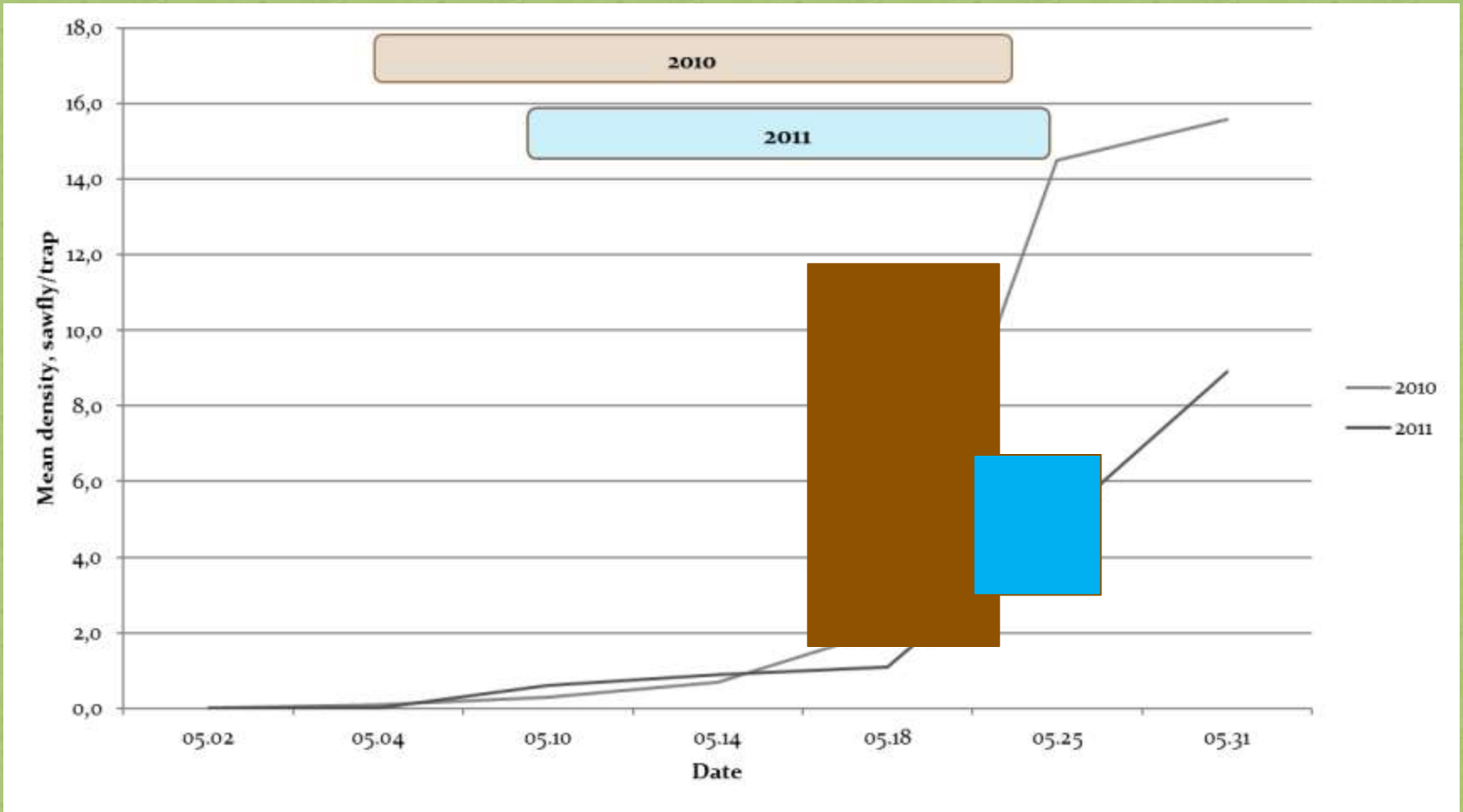


a) organic 2010; b) organic 2011; c) conventional 2010; d) conventional 2011

Coincidence between peak flight of apple sawfly and flowering period in organic orchard



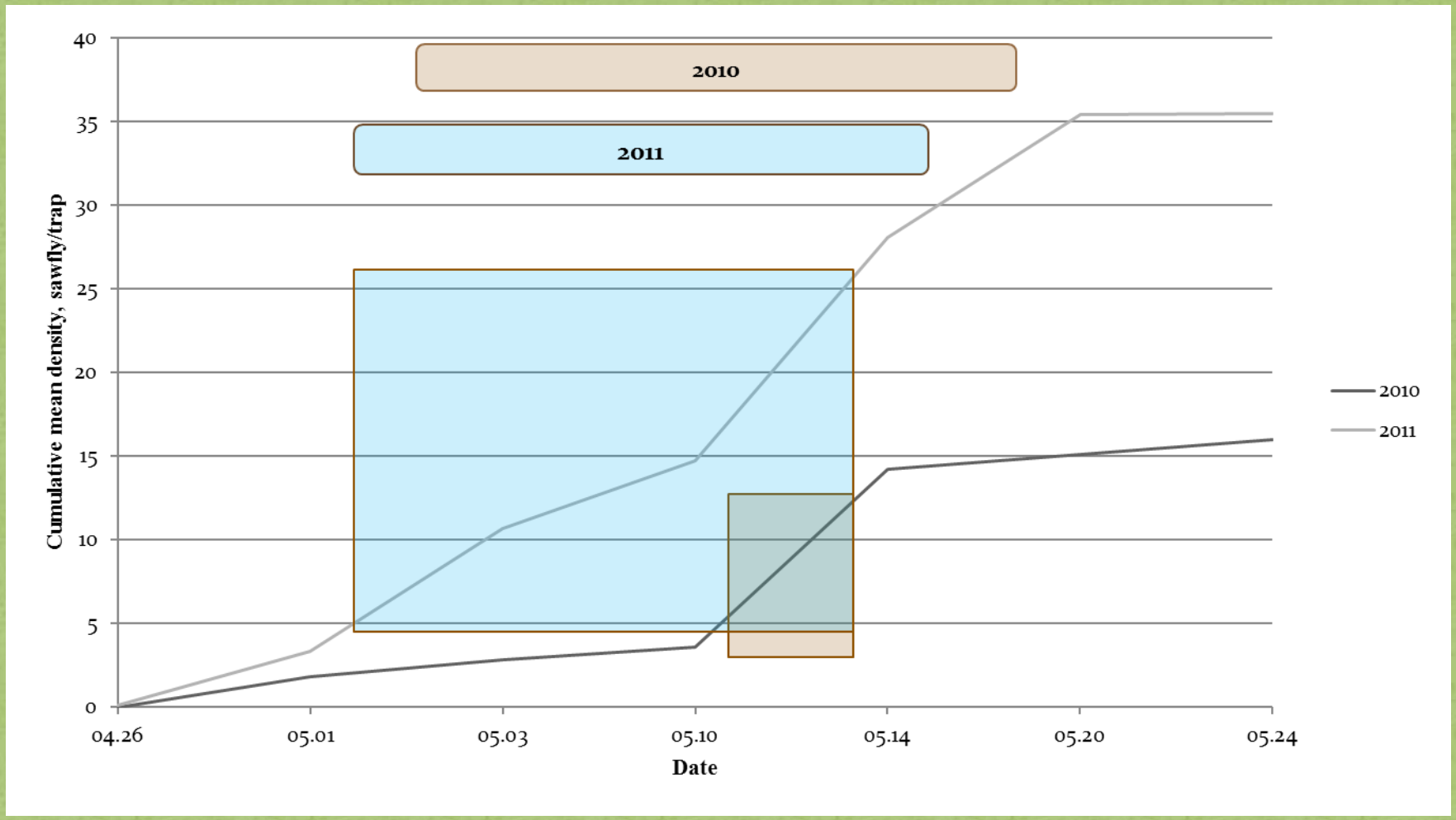
Coincidence between peak flight of apple sawfly and flowering period in conventional orchard



Apple sawfly cumulative mean density and infestation levels in different apple cultivars

	2010		2011	
Cultivar	Infested fruit %	Cumulative mean density, sawfly/trap	Infested fruit %	Cumulative mean density, sawfly/trap
Conventional orchard				
Noris	18,2	11	0,1	7,5
Lodel	3,4	7,7	0,1	6,8
Ligol	0	12	0	15,5
Auksis	14,2	33,3	0,2	4
Delikates	1,8	9	0,2	5,8
Alva	0,6	12	0	16,8
Spartan	2,6	11	0	7,8
Lobo	8,8	22	0	8,8
Connell Red	1	15	0	11
Total	**5,6**	**14,8**	**0,1**	**9,3**
	r^2=0,2467; p=0,1737		r^2=0,5430; p=0,0235	
Organic orchard				
Rubinola	13,3	17	0,5	3
Aldas	24,3	16	1,7	1,3
18051	11,9	51	2,5	5,5
Vitos	14,7	69	1,7	8,3
Enterprise			1,8	3,5
Lodel			3,2	4,8
Rajka			2,2	3
Total	**16,2**	**38,3**	**1,9**	**4,2**
	r^2=0,2477; p=0,5022		r^2=0,0573; p=0,6049	

Coincidence between peak flight of plum sawflies and flowering period



Plum sawflies cumulative mean density and infestation levels

	2010		2011	
Cultivar	Infested fruit %	Cumulative mean density, sawfly/trap	Infested fruit %	Cumulative mean density, sawfly/trap
Plum orchard				
Stanley	7,0	14,0	35,4	25,0

Conclusions

- **Density of apple and plum sawfly population had certain impact on infestation level, however very important factor proved to be coincidence between peak sawfly population increase period and susceptible flowering stage of the host plant.**
- **Prolonged flowering period contributed to higher apple sawfly damage.**
- **No direct relation between population density and infestation levels was observed. Further studies must be conducted to determine varietal differences.**
- **Temperature sum of 120 degree-days for apple sawfly adult spring emergence was established in order to optimize timing for trap installation into orchards.**
- **Pre-bloom insecticide applications suppressed initial apple sawfly population growth and shifted it towards the end of flowering phase greatly reducing infestation levels.**
- **White sticky traps are helpful tools for sawfly population scouting, infestation prognosis and decision making and should be included as part of IPM programme.**

Thank you for your attention!