

# PESTICIDE RESIDUE ANALYSIS OF HOPS

## (crop 2016 -2018)

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### Introduction:

Current agriculture is focused on high yields and quality of harvested product. Due to worsen climatic conditions, it is sometimes difficult to find suitable agrochemicals for the protection of hop gardens that meet the health requirements of the final product. The quality of hops is evaluated from several points of view. One is the brewing value of hops and the other, which is still gaining importance, is the food safety of the processed hops (content of heavy metals, residuum of pesticides, nitrates etc.).

### Method of determination:

Our laboratory uses the internal QuEChRS methods as the primary reference for pesticides analysis in hops. Analysis is conducted employing GC-MS/MS and LC-MS analysis. Profiles are designed to meet maximum residue levels (MRLs) established for both domestic and foreign MRL requirements whenever possible.

### Sampling and screening of hops:

Acquired results from hop fields (dissipation curves of Spirotetramat, Mandipropamid, Ametoctradin and Dimethomorph (2018) and hop analysis on pesticide residue content are presented for the period 2016 - 2018.

### Discussion and Results:

Table 1 Summary of positive results (pesticide residue analysis crop 2016 – 2018). The results of positive findings correspond to the „Methodology of hop protection“, which is annually issued by the Hop Research Institute in Žatec (CHI) and Central Institute for Supervising and Testing in Agriculture (ÚKZÚZ) administration established by the Ministry of Agriculture of the Czech Republic, an organisational unit of the state system and an administrative authority).

The results show that in accordance with the EU legislation, which recommend (from 2017) decreasing the consumption of Copper based agrochemicals – 4 kg of Cu/ ha / year, the usage of copper free pesticides are slightly increased.

It is positive fact that so far the MRL limits of used pesticides have not been exceeded in any of the analysed hop products.

Next active compounds were not detected – Abamectin, Fosetyl-AI, Cymoxanil, Flonicamid, Fluopicolide, Folpet, Imidacloprid, Metalaxyl, Quinoxifen, Tabuconazol and Thiamethoxam.



Photo 1 Analytical instruments (LCMS and GC – MS/MS) in our laboratory

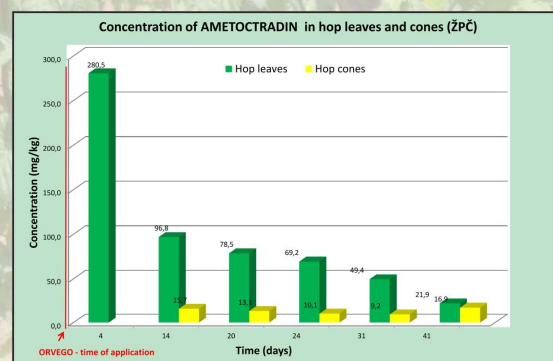
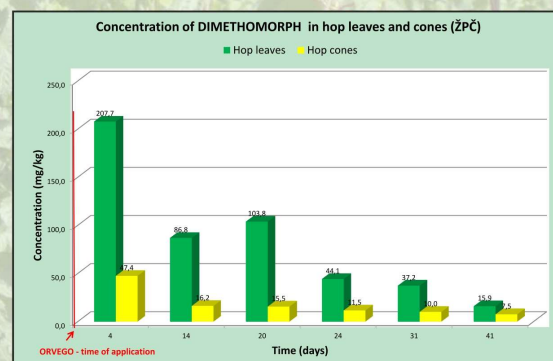
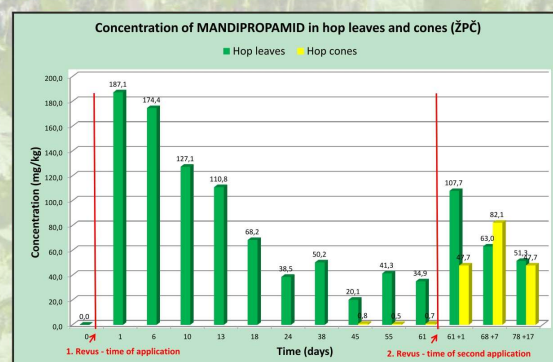
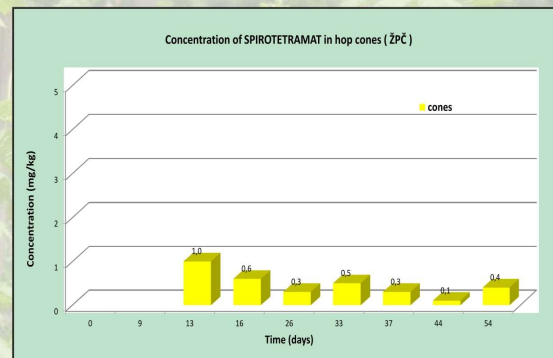


Figure 1 – Dissipation curves of Mandipropamid (REVUS), Spirotetramat (MOVENTO), Ametoctradin and Dimetomorph (ORVEGO) – crop 2018

Pesticide – active substance / (trade name)	MRL (mg/kg)			Analyte concentration (mg/kg)								
	CZ (EU)	USA	JAPAN	crop 2016			crop 2017			crop 2018		
				min. value	max. value	average value	min. value	max. value	average value	min. value	max. value	average value
Azoxystrobin / (Ortiva, Zakeo)	30	20	30	0,09	9,33	1,21	0,10	4,65	1,35	0,36	5,73	2,60
Fenpyroximate / (Ortus 5 SC)	15	10	15	0,11	0,49	0,35	0,17	0,58	0,37	0,21	2,00	0,72
Hexythiazox / (Nissorun 10 WP)	20	20	25	0,03	0,25	0,14	0,05	0,25	0,12	0,10	0,28	0,18
Mandipropamid / (Revus, Pergado F)	90	50	90	0,25	7,61	2,25	0,82	16,82	5,68	0,82	47,70	5,71
Pyraclostrobin / (Bellis)	15	23	15	0,31	1,14	0,50	0,10	1,44	0,56	0,20	6,20	1,06
Boscalid / (Bellis)	80	35	60	1,09	10,62	3,30	0,18	5,01	2,68	0,53	19,20	3,66
Spirotetramate / (Movento 150 OD, Movento 100 SC)	15	10	15	n.d.	n.d.	n.d.	0,44	0,66	0,55	0,32	1,93	0,87
Lambda-cyhalothrin / (Karate se Zeon tech.)	10	10	10	n.d.	n.d.	n.d.	0,14	0,14	0,14	n.d.	n.d.	n.d.
Ametoctradin / (Orvego)	100	100	30	n.d.	n.d.	n.d.	3,87	21,76	13,40	1,81	16,90	5,39
Dimethomorph / (Orvego)	80	60	80	n.d.	n.d.	n.d.	1,35	5,97	4,26	0,23	7,50	1,91
Bifenazate / (Acramite 480 SC)	20	15	20	0,12	0,51	0,22	0,14	0,20	0,18	0,20	1,35	0,62

n. d. – not detected

Table 1 Summary of positive results - crops 2016 -2018

### References:

- 1) EU pesticide database 2018
- 2) Methodology of hop protection (2016, 2017 and 2018), CHI Žatec and ÚKZÚZ Brno