THE EFFECTIVENESS OF PLANT METABOLITES EXTRACTED FROM PLANTS ON LARVAE OF THE FIRST AGE AT COLORADO BEETLE

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Abstract

Metabolic extracts obtained from plants harvested in preparation causes mortality between 67-100% over the same extracts made from plants harvested the year before. The same phenomenon was observed in all variants Repellent who used plants harvested in 2014, and those collected in 2013, only the extract from *Tanacetum vulgare* L. affected by this phenomenon. Also consumption increases exponentially leaf variants harvested in 2013. These phenomena were determined in the laboratory may lead to the idea that some plants by storing a longer period of time may lose some or transformed into other substances chemical combinations leading ultimately to the differences in mortality of larvae. Since we are tempted to say that the plant extracts are preserved better in alcohol and no in water, knowing very well the maintenance of its property, from the results presented herein just the opposite: larval mortality was higher by 10-30% in the extracts obtained in water at some alternatives to those obtained in alcohol

Key words: mortality, repellent, consumption, vegetable extracts, storage

The control of Colorado potato beetle population is achieved mainly with chemical insecticides, which in addition to induce positive economic issues and a number of inconveniences risk to human health and the environment. As an alternative to synthetic insecticides, one of the existing concepts for the control relates to the use of insecticides extracted from various plants. They are classified as primary metabolites and secondary metabolites (Silva et al., 2002). The most abundant are the primary metabolites are often stored in seeds or other organs required for the physiological development of the plant. These chemicals have a role in defense and some plants are stored in sufficient quantities for their classification as a vegetable insecticides. By-products have potential effects on insects, low mammalian toxicity, reduced neurotoxic action, low persistence in the environment and good biodegradability (Bruda et al., 2008).

Even if they have a certain value in combating these substances in a simple extraction degrades quickly have a short residual activity, and are not available in the long term.

MATERIAL AND METHOD

In laboratory conditions, in order to determine the effect of extracts metabolic the larvae of the first age of the Colorado potato beetle were placed leaves freshly harvested potato in Petri dishes after previously were immersed for three seconds in the product to be tested and it was wrapped in cotton petiole for hydration. After dryind product leaves in each Petri dish was placed larvae (L1L2). It followed from time to time mortality manifestation process repellents and food consumption (Tălmaciu M.,1996).

It was highlighted that by keeping dry (ground plants) or by way of extraction (alcohol or water) metabolites in plant extracts or lose from their "potential insecticides." The species used are in the ecological area of Suceava County, and they were selected on the basis of a bibliographic study that confirmed the presence in the composition of plant secondary metabolites that might present action on insects. They were dried under natural conditions then were made into powder by grinding. They used plants harvested in different years (2013 and 2014).

Extraction of metabolites was carried out in aqueous and alcohol. Water extracts were performed using 25 g powder / l of distilled water and stirred for 24 hours. Alcohol extracts were performed using the same method - 25 g powder in 200 ml of alcohol and was filled up to 1 liter. After filtration to obtain an extract of the plant metabolism in a concentration of 10%.

RESULTS AND DISCUSSION

a) *The influence of extracts obtained from plants harvested* in different years on young larvae of Colorado potato beetle.

As in other experiments that targeted larvae of Colorado potato beetle were noticed some differences between the propagation

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consumption of leaf treatments carried out with the same product at the same time (Lacatusu Matilda 1980), to determine the capacity of protection of the foliar area of the extracted metabolic were obtained from plants harvested in different years (2013 and 2014 respectively) whereas there was a suspicion that by keeping a longer period of time, they lose their properties.Compared to 2014, when harvested plants were used immediately after drying and grinding, the harvested in 2013 were stored in hermetically sealed glass container and used the following year.

The extract obtained from *Sambucus ebulus* L., 2013 harvested leaf consumption gradually increases even after completion of treatment, showing a consumption of about 25% of the leaf surface after four days of observation, while next year the harvest obtained

consumption of only 3%. The same was observed in *Artemisia absyntum* L., when the differences between the two years were very high (about 46% in 2013 and 8% in 2014). And *Tanacetum vulgare* L. differences were observed, but they did not exceed 3% between the two years (*table 1*).

Table 1

Dependence of the consumption of leaves (%) of the plant extracts used in the treatment

Var.	Extract of	Year	The proportion of leaf eaten by the larvae							
			8.08		9.08		10.08		11.08	
			%	dif.	%	dif.	%	dif.	%	dif.
1.	*Sambucus ebulus* L.	2014	1	-7 ^{o}	3	-15 ^{o}	3	-25 ^{o}	3	-47 ^{oo}
2.	*Artemisia absyntum* L.		2	-6	7	-11	8	-20	8	-42 ^{o}
3.	*Tanacetum vulgare* L.		3	-5	3	-15 ^{o}	6	-22	6	-44 ^{oo}
4.	*Tanacetum vulgare* L.	2013	1	-7 ^{o}	1	-17 ^{o}	2	-26 ^{o}	3	-47 ^{oo}
5.	*Sambucus ebulus* L.		7	-1	13	-5	23	-5	25	-25
6.	*Artemisia absyntum* L.		11	3	23	5	40	12	46	-4
7.	Witness	-	8	mt	18	mt	28	mt	50	mt
	DI 5%		7							
	DI 1%		10							
	DI 0,1%		17							

Table 2

Larval mortality and the repelent manifestation process

Var.	Extract of:	year	Larval mortality (M), repelence(R)					
			8.08.2014		9.08.2014		10.08.2014	
			M* %	R*	M %	R	M %	R
1	*Sambucus ebulus* L.	2014	0	R	80	R	100	R
2	*Artemisia absyntum* L.		0	R	47	R	60	R
3	*Tanacetum vulgare* L.		27	R	48	R	67	R
4	*Tanacetum vulgare* L.	2013	0	R	0	R	40	R
5	*Sambucus ebulus* L.		0	-	0	-	47	-
6	*Artemisia absyntum* L.		0	-	0	-	0	-

As regards the manifestation of the phenomenon of death, an extract made from Sambucus ebulus L in use resulted in a mortality of 80% after two days from the treatment, so that in the last days of observation, it increased to 100%, while Why variant harvested in 2013, the mortality rate was only 47%, less than 53 percent as the 2014 version (*table 2*). The most significant results were obtained from *Artemisia absyntum* L. determined

that a Colorado potato beetle larvae mortality by 60% in 2014, compared to 0% mortality in 2013. *Tanacetum vulgare* L. extracts obtained results closer ceava between the two years, 67% in 2014 and 40% for extracts from the previous year (tab.2).

Repellent phenomenon was observed in all variants were harvested in 2014, and to those harvested in 2013, just extract from *Tanacetum vulgare* L. affected by this phenomenon.

These differences which were determined in the laboratory can lead to the conclusion that some plants upon storage for a longer period of time may lose some substances or be transformed into other chemical combinations which finally led to the differences in consumption shown in Table 1, or The difference in mortality as in Table 2.

b) The influence of alcohol and vegetable products extracted water on L1 and L2 larvae feeding on beetle Colorado

The purpose of this experiment was to follow

in the laboratory influence on larval extracts of 13 in the first two ages, the event feeding, and the process of shedding mortality. The experiment was conducted on 06.18.2014 in four repetitions

and statements were made alcohol.

Except variants treated with extracts from *Tanacetum vulgare* L. and *Sambucus ebulus* L, the other variants feeding process was impressive to three days following treatment. Because consumption was high in variants 2-5 larvae larval moulting going into the next age.

Although consumption occurred in a lower percentage than the variants 2-5 at others variants, the larvae molt have extracts probably acting as growth inhibitors (Dryopteris Filis-mas (L.) Schott., *Tanacetum vulgare* L ., *Urtica dioica* L., *Sambucus ebulus* L., *Artemisia absyntum* L. and *Taxus baccata* L.) (*table 3*).

Table 3

The alcohol plant extracts influence on feeding larvae in the early ages

Var.	Extract of:	21.06.2014			22.06.2014		
		C*	N*	M* %	C	N	M %
1.	*Driopteris filis mas* (L.) Schott	+	-	0	-	-	27
2.	*Salvia nemorosa*	+	+	0	+	+ L_4	0
3.	*Petroselenium crispum* L.	+	+	0	+	+ L_3	7
4.	*Artemisia dracunculus* L.	+	+	0	+	+ L_3	13
5.	*Stachys silvatica*	+	+	7	+	+	7
6.	*Tanacetum vulgare* L.	-	-	0	+	-	7
7.	*Urtica dioica* L.	+	-	0	+	-	20
8.	*Sambucus ebulus* L.	-	-	0	-	-	13
9.	*Artemisia absyntum* L.	-	-	7	+	-	0
10.	*Aristolochia clematitis*	+	-	0	-	-	20
11.	*Artemisia vulgaris* L.	+	-	0	+	+ L_4	0
12.	*Heracleum sphondylium* L.	-	-	27	+	+ $L_{3,4}$	7
13.	*Taxus baccata* L.	-	-	0	-	- $L_{1,2}$	13
14.	Untreated	+	-	0	+	+ L_4	0

On 21.06, mortality phenomenon manifested only in two variants, namely *Stachys sylvatica* L. extract from (7%) and extract made from *Heracleum sphondylium* (27%). The next day, the percentage of mortality ranged between 7-27%. Overall, the highest percentage of mortality was obtained at *Heracleum spondylum* L. extract made from 34%.

The statements made in water treatment was executed on 26.06, and after three days of leaf consumption is between 7-40%, the lowest decimation of leaf area hovering at variants treated with extracts *Tanacetum vulgare* L. and *Artemisia absyntum* L. and highest consumption variant treated with *Heracleum spondylum* L., exceeding the untreated control by 8%. Further feeding dynamics increases, so the next day consumption is between 12-73% almost double the predcedentă day.

Table 4

The influence of plant extracts in water on feeding larvae L1-L2 in 2014

Var.	Extract of:	Consumption of leaves (%)				Larval mortality (%)			
		29.06		30.06		29.06		30.06	
		%	dif.	%	dif.	%	dif.	%	dif.
1.	*Driopteris filis mas* (L.) Schott	10	-22	12	-55 ^{ooo}	0	0	40	40 ^{xxx}
2.	*Salvia nemorosa*	23	-9	50	-17	7	-7	20	20 ^{x}
3.	*Petroselenium crispum* L.	23	-9	43	-24 ^{oo}	0	0	13	13
4.	*Artemisia dracunculus* L.	23	-9	43	-24 ^{oo}	0	0	7	7
5.	*Stachys silvatica*	10	-22 ^{ooo}	22	-45 ^{ooo}	0	0	13	13
6.	*Tanacetum vulgare* L.	7	-25 ^{ooo}	33	-34 ^{ooo}	27	27 ^{xx}	33	33 ^{xx}
7.	*Urtica dioica* L.	10	-22	20	-47 ^{ooo}	7	7	33	33 ^{xx}
8.	*Sambucus ebulus* L.	25	-7	28	-39 ^{ooo}	27	27 ^{xx}	40	40 ^{xxx}
9.	*Artemisia absyntum* L.	7	-25 ^{ooo}	12	-55 ^{ooo}	60	60 ^{xxx}	60	60 ^{xxx}
10.	*Aristolochia clematitis*	10	-22 ^{ooo}	15	-52 ^{ooo}	47	47 ^{xxx}	60	60 ^{xxx}
11.	*Artemisia vulgaris* L.	10	-22 ^{ooo}	20	-47 ^{ooo}	20	20 ^{x}	40	40 ^{xxx}
12.	*Heracleum sphondylium* L.	40	8	73	6	13	13	0	0
13.	*Taxus baccata* L.	37	5	73	6	7	7	0	0
14.	Untreated	32	mt	67	mt	0	mt	0	mt
	DI 5%		10		19		16		18
	DI 1%		13		23		22		25
	DI 0,1%		19		32		31		35

The percentage of mortality on the 29.06 ranges from 0 to embodiments 1, 3, 4, 5 and 60% *Artemisia absyntum* L. The same solution was treated with extracts of *Aristolochia clematitis* obtained a mortality rate of 47% (*table 4*). On the last day of testing larval mortality has evolved very wide limits, the maximum phenomenon *Artemisia absyntum* L. not exceed the amount recorded the previous day, ie 60%, while the most significant increase was recorded in the variant treated with the extract metabolite *Driopteris filis-mas* (L.) (0 to 40%), *Urtica dioica* L. then from 7 to 33%. Unlike alcohol extracts, besides the three variants with high mortality (*Driopteris filis-mas* (L.), *Urtica dioica* L. and *Aristolochia clematitis* L.) and other extracts showed toxic: *Tanacetum vulgare* L., *Sambucus ebulus* L., *Artemisia absinthium* L. and *Artemisia vulgaris* L.. Toxicity was reduced from *Taxus baccata* L..

CONCLUSIONS

Metabolic extracts obtained for the plants harvested in preparation causes mortality between 67-100% over the same extracts made from plants harvested the year before. The most significant results were obtained from *Artemisia absyntum* L. determined that a Colorado potato beetle larvae mortality by 60% in 2014, compared to 0% mortality in the 2013 statements.

Activity of repelent was manifested in all variants that were harvested in 2014, and to those harvested in 2013, just extract from *Tanacetum vulgare* L. affected by this phenomenon.

The extracts obtained from *Dryopteris filix-mas* (L.), *Tanacetum vulgare* L., *Urtica dioica* L., *Sambucus ebulus* L., *Artemisia absyntum* L. and *Taxus baccata* L. not occurred larval molting, these substances acting as growth inhibitors.

Larval mortality was higher by 10-30% in water extracts obtained from some embodiments of those obtained with alcohol.

The action of metabolic extract by the larvae stage can reduce leaf area, without wishing to be bound have a strong insecticidal action capable of reducing the number density thereof.

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