

Efficacy of Quassia extract on the apple sawfly *Hoplocampa testudinea* Klug

Wirkung von Quassiaextrakt auf die Apfelsägewespe *Hoplocampa testudinea* Klug

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Abstract

The efficacy of Quassia extract with a standardized content of Quassin was proved in various field trials in different regions during three years. The amount of Quassin of 6 g/ha/m tree height will be recommended to practice. It is not important to have a contact effect on the eggs. The larvae must feed on the product before they enter the fruit. There is a very good efficacy on primary infestation. Furthermore, there is even an efficacy on secondary infestation. Thus, even if due to difficult conditions during application or not optimal termination of the treatment the efficacy on the primary infestation is not entirely sufficient, the secondary infestation will be controlled better.

Keywords: Quassia, sawfly, *Hoplocampa testudinea*

Introduction

The apple sawfly has caused serious damage in organic orchards during 1999/2000 in Germany and several other European countries. Since 2002, in the frame of a project financed by the German BMVEL, Quassia extract with a standardized content of the most important active ingredient Quassin was tested with various concentrations in several field trials in different regions. In the following, an overview of the results of the field trials is given.

Material and Methods

The trials had a randomised block design with 4 replications per treatment (minimum of 6-12 trees per replication) and took place in organic orchards. The application dates were determined considering the development of the host eggs and the growth stage of the host plant. Several times the development of the eggs of the sawfly was controlled using a stereomicroscope. After a certain time, the outlines of the larva become observable, then, shortly before hatching, the eyes of the larva can be seen. In a first time, the eyes are red, when they become black the hatching is imminent and the treatment must be applied as fast as possible. In the trials, applications with different amounts of Quassin per ha and different application dates were compared.

The primary infestation was assessed as soon as the galleries in the little fruits were seen. When the larvae changed in the second fruit, they were assessed again (secondary infestation). Both times casually selected 50 fruit clusters in each replication were controlled for infested fruits. The percentage of infestation was calculated dividing the number of infested fruits through the number of clusters controlled.

Results

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In most trials, with the amount of 6 g/ha/m tree height of Quassin the results were good. In several cases, acceptable results were achieved also with much lower amounts of Quassin (Table 1 a and b). If the modality (amount of water/ha) and the timing of the application is not good and the infestation is high, the efficacy of the 6 g/ha/m tree height of Quassin was not really sufficient in the control of the primary infestation. The efficacy on the secondary infestation was satisfying in all cases. This corresponds to the main experience in practice during the last years in Germany and other European countries.

Table 1: Efficacy (ABBOTT) and infestation in control in different field trials in several German regions (LC = Lake Constance; RP = Rhineland Palatinate, Jork = near Hamburg, northern Germany; SA = Saxony) during the years 2002 and 2003.

Dev. stage of sawfly: EOM: eyes of most larvae observable; EOF: eyes of first larvae observable; LO: outlines of the larva observable; FLH: first larvae hatching

Region /Year	Quassin g/ha/m tree height	volume of water in l/ha	equipment used for application	Growth stage of apple	Dev. stage of saw- fly	Primary in- festation in untreated control (%)	Efficacy of the treat- ment in %	
							Primary infestation	Secondary infestation
LC 2002	4	1.000	knapsack	65	LO	43	66.3	91.5
	6	1.000	sprayer	65	LO		80.2	98.8
	9	1.000	SOLO	65	LO		87.2	91.5
LC 2002	4	1.000	knapsack	65	LO	33	81.8	90.7
	6	1.000	sprayer	65	LO		87.9	92.0
	9	1.000	SOLO	65	LO		93.9	97.3
LC 2002	4	1.000	k.sprayer	65	LO	105	65.7	82.0
	6	1.000	SOLO	65	LO		73.3	82.5
RP 2002	3	1.000	Schachtner	65	EOM	9.5	84.0	95.7
	6	1.000	orchard plot	65	EOM		92.1	96.8
	9	1.000	sprayer	65	EOM		97.4	96.2
Jork 2002	3	1.000	Myers or- chard	65	EOM	34.5	30.4	70.0
	6	1.000	sprayer	65	EOM		37.7	66.9
	9	1.000	sprayer	65	EOM		65.2	91.5
LC 2003	2	1.000	knapsack	67	EOM	70.5	92.9	100.0
	6	1.000	sprayer	67	EOM		97.2	98.2
	9	1.000	SOLO	67	EOM		93.6	100.0
Jork 2003	2	1250	Myers SC	67	EOF	64.0	90.7	no ass.
	3	1250	Myers SC	67	EOF		81.3	possible

Table 2: Efficacy (ABBOTT) and infestation in control in different field trials in several German regions (LC = Lake Constance; RP = Rhineland Palatinate, Jork = near Hamburg, northern Germany; SA = Saxony) during the year 2004.

Dev. stage of sawfly: EOM: eyes of most larvae observable; EOF: eyes of first larvae observable; BEL: before egg laying; LO: outlines of the larva observable; FLH: first larvae hatching

Region /Year	Quassin g/ha/m tree height	volume of water in l/ha	equip- ment used for applica- tion	Growth stage of apple (BBCH)	Dev. stage of sawfly	Primary in- festation in untreated control (%)	Efficacy of the treatment in %	
							Primary infestation	Secondary infestation
SA 2004	2	1.000	knap- sack sprayer	59	BEL	73.3	38,1	69,7
	2	1.000		65	LS		67,2	64,1
	2	1.000		67	EOM		87,7	78,8
	9	1.000		59	BEL		79,7	96,0
	9	1.000		65	LS		88,0	84,8
	9	1.000		67	EOM		90,0	94,7
LC 2004	2	1.000	knap sack sprayer SOLO	65	LS	13.3	71,8	58,9
	6	1.000		65	LS		83,1	75,0
	9	1.000		65	LS		77,4	83,9
	2	1.000		67	EOM		81,2	71,4
	6	1.000		67	EOM		83,1	85,7
	9	1.000		67	EOM		83,1	82,1

Discussion

The efficacy of Quassia extract with a standardized content of Quassin was proved in various field trials in different regions during three years. The amount of Quassin of 6 g/ha/m tree height will be recommended to practice. To provide a sure efficacy, the application date and the modality of application are of great importance (Kienzle et al., 2006). It is not important to have a contact effect on the eggs. The larvae must feed on the product before they enter the fruit. There is a very good efficacy on primary infestation. Furthermore, there is even an efficacy on secondary infestation. Thus, even if due to difficult conditions during application or not optimal termination of the treatment the efficacy on the primary infestation is not entirely sufficient, the secondary infestation will be controlled better.

With the Quassia extract with standardized content in Quassin the organic farmers have at their disposition a reliable and effective product for an essential use in organic fruit growing.

Literature Cited

Kienzle, J.; Zimmer, J.; Maxin, P.; Rank, H.; Bathon, H.; Zebitz, C.P.W. (2006, in press): Control of the apple sawfly *Hoplocampa testudinea* Klug. Proceedings of the 12th International Conference on Cultivation Technique and Phytopathological Problems in Organic Fruit-Growing, Weinsberg, *in press*