

# Evaluation of the insecticidal efficacy of the formulations based on inert dust and botanicals against rice weevil *Sitophilus oryzae* L.

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## Introduction

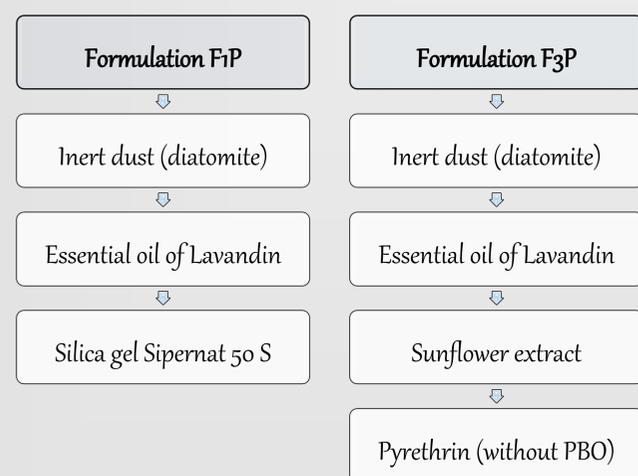
Concerning the growing evidence of negative effects of pesticide usage in stored products protection, there is increasing demand for alternative methods without harmful effect on health and environment. Inert dusts include all dry powders (clay, sand, ground phosphate, ash, diatomaceous earths) of different origins that are chemically un-reactive in nature.

We developed new formulations based on inert dusts and botanicals. In the preliminary testing their efficacy against the rice weevil *Sitophilus oryzae* (L.) was evaluated.

## Results

Formulation F1P caused 100% mortality of adults *S. oryzae* at 300 ppm after 7 days and at 200 ppm after 21 days of exposition. Formulation F3P reached maximum mortality at the highest dose (400 ppm after 21 days). After 21 days, LD<sub>50</sub> and LD<sub>90</sub> were 80.2 ppm and 126.3 ppm, respectively for F1P and 107.6 ppm and 270.7 ppm, respectively for F3P. Both formulations significantly reduced progeny production; with percentage of inhibition ranged from 82.0 to 99.6% for F1P, and from 81.7 to 96.5% for F3P, depending on dose.

## Material and methods



Five doses of each formulation were mixed separately with 100 g of wheat grain and the efficacy was estimated through adult mortality, after 7, 14 and 21 days and through the F<sub>1</sub> progeny production, after 49 days. All treatments were set in three repetitions with 25 adult weevils, 7-21 days old in each repetition.

Table 1 Insecticidal efficacy of F1P and F3P formulations against *Sitophilus oryzae* (L.) adults after 7, 14 and 21 days of exposure to treated wheat grain and their interference in F<sub>1</sub> progeny production

Treatment	Dose (ppm)	Exposition			Number of adults (mean ± SD <sup>a</sup> )	Percentage of inhibition (%)
		7 d (mean ± SD <sup>a</sup> mortality)	14 d (mean ± SD <sup>a</sup> mortality)	21 d (mean ± SD <sup>a</sup> mortality)		
F1P	0	1.3±2.30 c	1.3±2.30 c	1.3±2.30 c	353.6±22.18 a	-
	100	41.3±37.80 bc	65.3±31.06 b	70.6±25.71 b	60.3±50.30 b	82.05
	200	80.0±8.00 ab	94.6±4.61 a	100.0±0.00 a	14.6±5.68 b	95.88
	300	100.0±0.00 a	100.0±0.00 a	100.0±0.00 a	1.6±2.08 b	99.55
	400	94.6±9.23 a	100.0±0.00 a	100.0±0.00 a	10.6±14.15 b	97.01
	500	100.0±0.00 a	100.0±0.00 a	100.0±0.00 a	1.3±0.57 b	99.64
	F	18.28	28.16	42.47	106.50	
	P	<.0001	<.0001	<.0001	<.0001	
		LD* <sub>50</sub>	135.78 ppm (32.06-215.55)	91.46 ppm (70.50-111.25)	80.27 ppm (868.93-90.29)	
	LD* <sub>90</sub>	261.91 ppm (189.58-499.70)	161.23 ppm (137.89-199.38)	126.31 ppm (113.86-145.57)		
F3P	0	1.3±2.30 d	1.3±2.30 c	1.3±2.30 c	353.6±22.18 a	-
	200	21.3±10.06 cd	61.3±15.14 b	78.6±2.30 b	50.3±21.38 b	85.78
	250	46.6±10.06 bc	80.0±10.58 ab	90.6±12.8 ab	26.6±21.93 b	92.48
	300	54.6±19.73 ab	85.3±6.11 a	94.6±6.11 ab	64.6±50.14 b	81.74
	350	72.00±10.58 ab	96.0±4.00 a	98.6±2.30 a	25.6±18.50 b	92.77
	400	85.33±9.23 a	98.6±2.30 a	100.0±0.00 a	12.3±2.88 b	96.53
	F	22.19	58.81	118.95	71.99	
	P	<.0001	<.0001	<.0001	<.0001	
		LD* <sub>50</sub>	276.31 ppm (238.02-306.95)	158.88 ppm (110.65-188.02)	107.62 ppm (26.99-148.76)	
	LD* <sub>90</sub>	439.13 ppm (388.63-554.34)	310.04 ppm (289.01-339.89)	250.73 ppm (226.81-276.34)		

<sup>a</sup>Means in the same column within each formulation followed by the same letters are not significantly different (Tukey's HSD, *P*<0.05)

\*LC<sub>50</sub> and LD<sub>90</sub> expressed as parts per million (ppm), Confidence limits (CL) are given in parentheses

## Conclusion

Further testing should be done in order to evaluate their efficacy against other stored product insects under different conditions of grain moisture and temperature and also to test influence on bulk density reduction after mixing formulations with wheat grain.

## Acknowledgements

Financial support for this research was provided by the Croatian Science Foundation through scientific research project IP-11-2013-5570 www.diacromixpest.eu.

