Production of wettable powder biopesticide formulation from two superior *Bacillus thuringiensis* strains native to Northern Iran

Shazdeh Ahmadi, M.[1], Sajjadi, A.[2], Shahadati Moghaddam, Z.[1]

(1) Biotechnology and (2) Plant Pathology Department of Tirtash Research and Education Center, Iranian Tobacco Company

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Introduction

For economic use and preparation of toxins from micro-organisms and biological control agents, it is very important to produce a suitable formulation from superior native strains.

Due to the fact that native strains have more lethal power against the target pests of the same area, so in order to use the native strains collected against the environmental conditions in the field, appropriate formulation should be made from them. The purpose of this project is the production of wettable powder biopesticide formulation from two superior *Bacillus thuringiensis* strains native to Northern Iran.

Materials and Methods

After replicating the top two native *Bt* strains in the fermenter, powder and tablet formulations were made from the two strains by mixing 50% of the bacterial active ingredient plus 50% of the complementary ingredients. Suspending materials, moisture absorber, fillers and bulking agents, UV resistant materials, diffusers, stabilizers and synergists and surfactants with different percentages were used. Then, tests for formulation quality indicators such as measuring acidity, susceptibility, moisture content and determining the shelf life of the formulation were performed. The amount of LC_{50} formulation was also measured by probit statistical method.

Results and Discussion

The results the variance analysis of evaluation the different traits in *Bt* wettable powder produced, showed that traits (suspension concentration, moisture rate, determination of CFU and delta-endotoxin rate) were significant at 1% probability level, but PH rate was non-significant.

Mean comparison showed that treatment No. 4 was shown to be the superior treatment, because it had the lowest moisture, maximum suspension content, the highest number of CFU and highest level of delta-endotoxin.

Table 1- Analysis of variance of traits (acidity, suspension percentage, moisture content, CFU determination and delta endotoxin content) Bt wettable powder formulation produced.

Source of change	Degree of freedom	PH	Suspension rate (%)	moisture content(%)	CFU determination	Delta-endotoxin content
Treatment	3	0.01 ns	104 **	45 **	4×10^{18} **	26200 **
Error	8	0.005	4.5	3.5	0	175
CV (%)		1.14	3.16	7.05	0	1.6

** Significant at the level of one percent probability

ns Meaningless

Fig 1. View of wettable powder biopesticide of *Bt*

Table 2- Mean Comparison of evaluation of traits (percentage of suspension, moisture content, CFU determination and Delta-endotoxin content) in Bt wettable powder produced.

Treatment	percentage of suspension(%)	moisture content(%)	CFU	Delta-endotoxin content (mg/mL)
1	61	26	$9 \times 10^{9\,b}$	710^{d}
2	71	23	$9 \times 10^{9\,b}$	760^{c}
3	63	32	$1.1 \times 10^{10\,a}$	850^{b}
4	73	25	$1.1 \times 10^{10\,a}$	920^{a}

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