SOME ASPECTS OF THE BEHAVIOR OF 25 LINES INOCULATED WITH ARTIFICIAL INFECTIONS WITH *FUSARIUM* SPP.

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Abstract

In Europe the most important pathogens that produce the breakage belong to the genus *Fusarium*, being *F. graminearum, F. culmorum, F. avenaceum, F. poae, F. oxysporum* and *F. lateritium*. Corn fusariosis is one of the main problems of this crop, encompassing all the areas around the world where this plant is grown. The most widespread species in the western area of Romania are: F. moniliforme and F. graminearum. Pathogens contribute to the degradation and quantitative and qualitative decrease of production on average by 20-25%. A limited number of diseases can damage the maize crops, causing significant losses of production. Among these are fusarian diseases which, due to their frequency and intensity, can be considered the most damaging for corn crops (Mureşan *et al*, 1973; Moose, 2004; Nagy *et al* 2006). Fusarium diseases reduce the value and quality of crops by massive accumulation of mycelial masses of mushrooms of the genus *Fusarium* (about 85%) on berries and earbuds as well as contamination with specific mycotoxins such as deoxynivalenol (DON), zearalenone (ZEA) and fumonisin (FUM) (Vyn and Tolenar, 1998; Yazar and Omurtag, 2008). This experience at the ARDS Lovrin corn amelioration laboratory is aimed at obtaining an initial material resistant to this disease, sorting, selecting existing material within the laboratory, and genetic aspects of maize resistance to this disease. Experience has taken place in the experimental field of the laboratory. In order to study this disease, (respectively the two species of *Fusarium*), three types of infections were carried out according to the organ of the plant: stalk (It); seed infections (Is); ear infections (Isht). The experimental genotypes are inbred lines in the cross-breeding program (25 variants) of different precocity groups, as well as inbred lines of parental forms of hybrids in culture and those proposed for homologation.

Key words: inbred lines, pathogens, artificial infections, *Fusarium* disease

Corn fusariosis is a disease that encompasses all the areas cultivated with corn on the globe and is manifested by rotting stalks and decaying rot, causing plant breeding, the impossibility of mechanically harvesting corn and producing toxins on the ears. *Fusarium* is one of the main diseases of this culture.

The strokes caused by this disease can be divided into: direct loss, due to the impossibility of mechanically harvesting the broken plants or indirect losses due to the parasitic cracking and degradation of the grains and the deterioration of their quality.

In addition to losses directly related to the braking phenomenon, other indirect losses such as low crop yield must be considered; time losses and additional costs due to manual harvesting of high-frequency brackets; increasing the amount of inoculum in the soil by remaining vegetal remains infected in the soil; the poisoning of animals through the consumption of grain from sick ear.

It has been found that the most effective way to reduce the losses caused by this disease is selection and improvement for resistance.

MATERIAL AND METHOD

The experience was conducted in the Laboratory of Corn Improvement at SCDA Lovrin in 2016 and continued in 2017. It was followed by the behavior of 25 inbred lines (the majority of the selection but also 5 established lines, parental forms of hybrids created in Lovrin) to artificial infections with fungus

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Fusarium moniliforme. Lines under study were sown on April 24, 2016. Sowing 40 plants / variant, of which 20 plants with treatment and 20 control plants. Lines under study were sown on April 24, 2016. Sowing 40 plants / variant, of which 20 plants with treatment and 20 control plants (*figure 1*).

20 pl.	*	*	*	Alley	*	*	*	Alley	*	*	*	Control
	*	*	*		*	*	*		*	*	*	
	*	*	*		*	*	*		*	*	*	
	*	*	*		*	*	*		*	*	*	
	*	*	*		*	*	*		*	*	*	
Alee												
20 pl.	I	/	V	Alley	I	I	I	Alley	I	I	I	Infected
	I	/	V		I	I	I		I	I	I	
	I	/	V		I	I	I		I	I	I	
	I	/	V		I	I	I		I	I	I	
	I	/	V		I	I	I		I	I	I	
Infection	Is	It	Ișt		V1				V2			etc…V25

Figure 1 **Scheme of the field of infection**

During the blossoming period - the appearance of the stigmas was made artificial infection. Three types of organ infections were performed:seed infection (Is), stalk infection (It), ear infection (Ișt).

The seed required for the sub-variant Is has been infected and sown later, two weeks after the other two sub-variants It and Ișt.In case of stalk infection, the method of inoculating a suspension of conidia and mycelium at the base of the stalk (at the second internode) was used. Also with the same suspension was made the inoculation of the ear, between the husks of the ear.

In order to express the value of the attack on the studied lines, with different degrees of susceptibility to the attack of the fungus, it was observed:

Attack frequency (F%) - determining the percentage of attacking ear against the total number analyzed. The percentage obtained shall be converted into notes on the following scale from *table 1*.

Table 1

Scoring scale for frequency and intensity of attack

% of the examined organs	Plant reaction	Note
0	Immune	0
1-10	Very resistant	1
10 – 20	Resistant	2
20 – 50	Attacked	3
50 – 75	Sensible	4
75 - 100	Very sensible	5

The same scale was also used for attack intensity (I%) - representing the number of grains attacked on the ear.

The degree of attack (GA) - the mark obtained is derived from the product obtained between the grade F% x note I%, the values will be between 1 and 25.

The attack on the stalk was assessed by the surface of the resulting caverns, highlighted by longitudinal sectioning of the stem. And the attack on the strain determined the frequency of the attack (the number of plants attacked from the total analyzed).

RESULTS AND DISCUTIONS

This study highlighted several corn inbred lines created at SCDA Lovrin, resistant or very resistant to the natural and artificial attack of fusariosis in both stem and ear.

The most resistant lines to the attack of the fusatise strain, in terms of frequency and intensity of attack, expressed in notes 0 to 5, were: Lv 91, Lv 99 and Lv 108. The above-mentioned lines had a reduced number of plants attacked from all plants analyzed after infection.

The most sensitive lines were Lv 87, Lv 89, Lv 92 and Lv 102. This is also evident from

figure 2 which represents the response of the lines to the strain attack.

Regarding the reaction of artificially infected plants to the cobs, the attack response is much more obvious, as shown in the graph shown in Fig. Thus, lines Lv 87, Lv 97, Lv 98, Lv 100 and Lv 1700 have been shown to be susceptible to artificial infection with *Fusarium*.

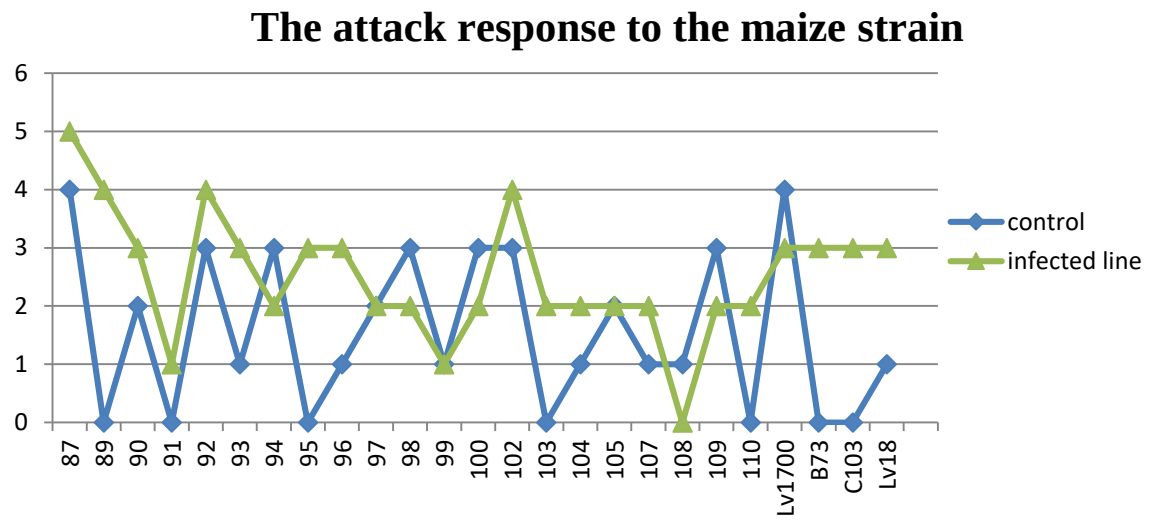

Figure 2 **The attack response to the maize strain**

Regarding the reaction of artificially infected plants to the cobs, the attack response is much more obvious, as shown in the graph shown in *figure 3*. Thus, lines Lv 87, Lv 97, Lv 98, Lv 100 and Lv 1700 have been shown to be susceptible to artificial infection with *Fusarium*.

On the opposite side we find a relatively large number of very resistant and resistant to artificial infection with Fusarium, such as Lv 91, Lv 92, Lv 93, Lv 94, Lv 95, Lv 105, Lv 107, Lv 108, C103 and B73.

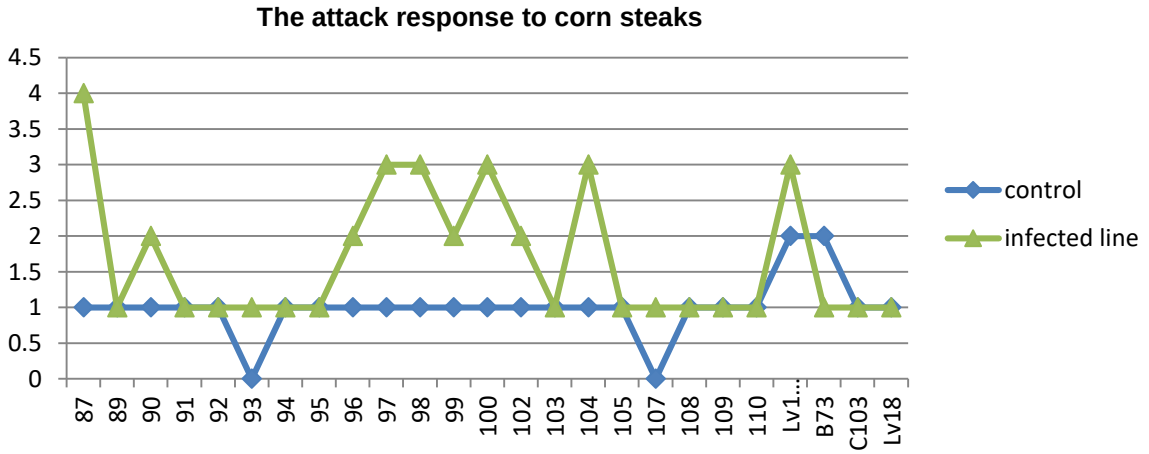

Figure 3 **The attack response to corn steaks**

With regard to the degree of attack on Scions, the highest values are found on the lines: Lv 87, Lv 100, Lv 104 and Lv 1700, these lines being the most sensitive. The degree of attack with the smallest or the most sensitive lines is Lv 93, Lv 91, Lv 107, B73 and C103, as shown in *figure 4*.

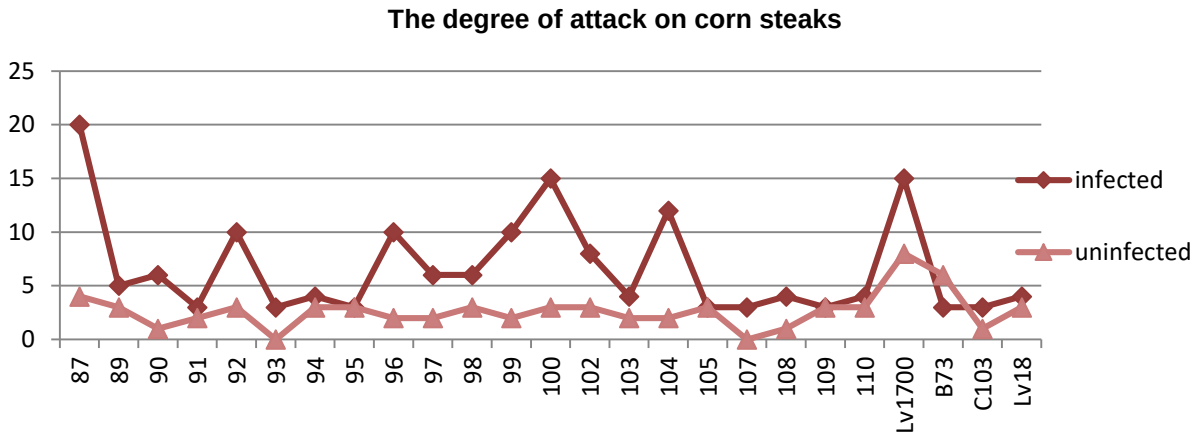

Figure 4 **The degree of attack on corn steaks**

CONCLUSIONS

This study initiated in the field of corn amelioration at SCDA Lovrin will continue in the near future. We will also expand this study in terms of premature drying, rotting roots, stem base, breaking and falling corn plants.

Experience in the corn amelioration laboratory is aimed at obtaining an initial material resistant to this disease, sorting, selecting the existing material within the laboratory, and genetic aspects of maize resistance to this disease.

However, these objectives are not the only objectives in the corn improvement process to achieve performance hybrids, but are essential because the lines identified as resistant and highly resistant to this disease are an important source of resistance genes for future use in the process for the improvement of maize.

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