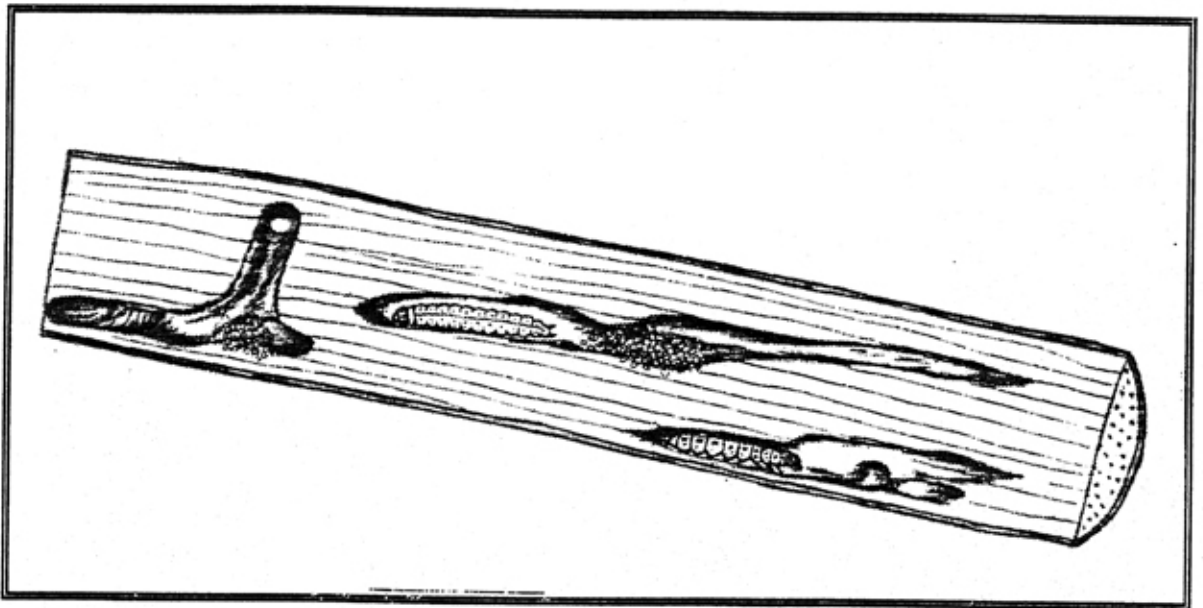


**Evaluation of  
Commercial Corn Hybrids  
for  
Resistance to European Corn Borer  
in Missouri**



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# 1989 EVALUATION OF COMMERCIAL CORN HYBRIDS FOR RESISTANCE TO THE EUROPEAN CORN BORER IN MISSOURI

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The European corn borer (ECB) remains a significant economic pest of corn. The 1989 growing season in Missouri was very favorable for the development of high populations of ECB. The initial impetus for these populations was a relatively mild dry winter, which allowed a large number of borers to survive the winter. Consequently, the first generation of ECB was abundant and contributed to an even larger second generation insect population.

## PROCEDURE

Selection of 100 commercial corn hybrids grown in Missouri, plus a susceptible and a resistant check, was made in cooperation with Dr. Harry Minor, based on his statewide corn variety testing program. These hybrids were grown in a randomized complete block design in single rows with three replications. Planting was at the Greenley Memorial Research Center, Novelty, MO, on April 27, 1989. All plots were artificially infested with ECB larvae. The first six plants of each row were infested with first generation ECB larvae by placing the newly hatched insects in the whorl of the plant (200+ insects/plant) on June 14 and 15, 1989. The plants were rated for first generation insect damage on July 6, 1989. The last six plants of each row were infested with second generation ECB larvae by placing the insects in the leaf axils, near the ear zone of the plant (200+ insects/plant), on July 21, 1989. The plants were dissected and tunnel damage estimated on September 19, 1989.

The LSD (0.05) is used to compare the performance of two specific hybrids at a time. It should not be used, however, to compare all pairs of hybrids. If the mean of hybrid "X" exceeds the mean of hybrid "Y" by the LSD (0.05) or more, the difference observed is a true difference in 19 out of 20 instances when the two hybrids are grown under conditions similar to those of the test. The CV% relates error of measurement and the mean of the observed character. High values indicate less repeatability of the data.

## RESULTS

The various corn hybrids and their first and second generation ECB resistance evaluations are presented in Table 1.

**First generation ECB resistance ratings** are on a scale of 1-9 (1=no leaf-feeding damage and 9=many long leaf-feeding lesions on most leaves). In 1989, hybrid ratings of 1.0-5.0 can be considered resistant to leaf-feeding damage of the ECB; 5.1-6.9 ratings indicate intermediate leaf-feeding resistance; and 7.0-9.0 ratings indicate susceptibility. The corn

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hybrids that rate susceptible are no doubt susceptible, but hybrids with lower ratings (1.0-5.0, resistant and 5.1-6.9, intermediate) could actually be more susceptible than indicated by the ratings presented. This is because some rated plants may have been "escapes" or "partial escapes." In other words, something happened to the artificially-infested ECB larvae before they could do much or any leaf-feeding. The reason for "escapes" may be that a plant was missed during the infestation process, the larvae were eaten by predators, or some other environmental factor killed the insects or prevented feeding. For 1989, it is unlikely that the ratings are low for the resistant and intermediate level of resistance because the overwintering population of ECB (1988-89) was high and the 1989 growing season was very favorable for ECB. Leaf-feeding ratings for 1989 tended to be a little more severe than would be expected or has occurred in most years. However, we have partially accounted for this by broadening the 1989 resistant and intermediate rating classification by one number (1.0-5.0 and 5.1-6.9, respectively). Our resistant check, Pioneer Brand 3184, had an average rating of 5.0 (normally rates <4.0), and the susceptible, Fontanelle 6230 rated 7.0.

**Second generation ECB resistance** evaluations are presented as average length of tunneling within the corn stalk. This is somewhat of an indirect evaluation for second generation ECB resistance, because we are measuring the tunneling by the residual ECB population. The antibiotic interaction between the corn plant and second generation ECB is primarily related to early instar ECB feeding on the leaf collar and sheath.

As indicated in Table 1, the average tunneling per plant of a hybrid ranged from 8.0 (resistant check) to 17.5 inches for the most resistant hybrid and most susceptible, respectively. We have evaluated Pioneer Brand 3184 (8 in. of tunneling 1989) and know that it has very good resistance to both the first and second generations of ECB. Fontanelle 6230 (15.2 in of tunneling 1989) has consistently been one of our most susceptible hybrids to both generations of ECB in our evaluation trials.

Those corn hybrids averaging less than 10.4 inches of tunneling per plant in the 1989 evaluations were considered to have a good level of second generation ECB resistance. Intermediate resistance was assigned to hybrids averaging 10.5-12.8 inches of tunneling per plant. Plants from hybrids averaging 12.9 or more inches of tunneling were rated as susceptible.

It may appear that a degree of ECB resistance has been assigned to various corn hybrids that showed economic levels of damage, but this is the general nature of resistance. When a cultivar normally resistant to a specific pest is overwhelmed by the infestation level of the pest, some degree of damage will result. This was the situation these experiments encountered in 1989. Resistance is a relative genetic trait.

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Table 1. Leaf-feeding damage ratings for first generation European corn borer (1<sup>st</sup> ECB) and stalk tunnel length of second generation European corn borer (2<sup>nd</sup> ECB) for corn hybrids evaluated at Novelty, MO, in 1989.

Hybrid	1 <sup>st</sup> ECB leaf-feeding rating	2 <sup>nd</sup> ECB tunnel length	Hybrid	1 <sup>st</sup> ECB leaf-feeding rating	2 <sup>nd</sup> ECB tunnel length
	(1-9) <sup>a</sup>	(in.) <sup>a</sup>		(1-9) <sup>a</sup>	(in.) <sup>a</sup>
Agratech 825	6.0	14.1	Hyperformer 82	5.3	9.4
Agratech 888	7.7	11.5	Jacques 7820	8.0	13.5
Agrigene 7400	7.3	12.5	Jacques 8210	3.3	13.4
Agrigene 7720	4.3	9.3	Lewis 2810	6.0	12.1
Agripro 610	6.0	11.1	Lewis 5106	6.7	10.9
Agripro 795	4.7	10.9	Lynks 2875	4.7	12.0
Agripro 798	5.0	11.7	MFA 3514	6.3	14.0
Agro RX908	7.0	12.9	MFA 3516	5.7	14.0
Americana 3600	6.0	11.5	McAllister 7300	5.0	11.5
Americana 4040	6.7	11.8	McCurdy 7477	3.0	11.2
Americana 4790	5.7	10.6	McCurdy 7777	5.0	11.7
Asgrow 746	7.3	9.7	Master Choice 575	7.0	15.5
Asgrow 860	4.7	11.4	Middlekoop 452	6.3	12.0
Asgrow 905	5.7	9.1	Middlekoop 465	8.0	8.9
Bo-Jac 601	6.0	13.2	NC+ 6414	3.7	11.5
Bo-Jac 602	6.7	13.7	Northrup King 6873	5.7	11.3
Bo-Jac 603	6.3	12.3	Northrup King 7751	6.7	14.9
Burrus 59	5.0	10.7	Neco 97A	4.7	14.7
Burrus 68	6.7	11.3	Neco A101	5.7	13.9
Burrus 94	4.7	9.5	Oro 120	6.7	11.9
CFS 7615	4.7	10.2	Pfister 3910	6.0	9.3
CFS 7707	5.7	16.5	Pioneer Brand 3181	5.7	10.9
CFS 8052	7.0	13.4	Pioneer Brand 3269	6.7	10.2
Cargill 6227	5.3	13.4	Pioneer Brand 3378	5.3	9.9
Cargill 7877	5.0	9.0	Querna 7670	6.0	13.8
Cargill 7993	6.7	13.8	Randell 7119	6.3	12.8
Coker 8625	6.7	13.2	Reeds 2550	6.7	14.5
Co-op 2305	8.0	14.9	Reeds 2600	6.3	14.2
Co-op 2350	8.3	8.7	S. Brand 63B	5.7	12.3
Crows 482	6.7	10.7	S. Brand 170	4.7	13.4
Crows 647	4.7	12.3	SeedTec 7525	5.3	11.7
Crows 697	5.0	13.1	SeedTec 7670	5.3	15.4
Delta Pine 5750	8.3	10.2	Southern Cross 411	6.0	11.9
Fontanelle 4535	6.0	12.7	Stone 36	5.0	12.0
Fontanelle 6235	7.0	12.2	Stone 259	6.7	12.7





Table 1. Continued.

Hybrid	1 <sup>st</sup> ECB leaf-feeding rating	2 <sup>nd</sup> ECB tunnel length	Hybrid	1 <sup>st</sup> ECB leaf-feeding rating	2 <sup>nd</sup> ECB tunnel length
	(1-9) <sup>a</sup>	(in.) <sup>a</sup>		(1-9) <sup>a</sup>	(in.) <sup>a</sup>
Fontanelle 6697	5.7	14.0	Sturdy Grow 815	6.3	14.7
Funks 4485	7.0	10.6	Sturdy Grow 826	5.7	10.2
Funks 4673B	8.7	12.5	Sturdy Grow 828	7.0	16.2
Garst 8315	4.3	10.7	Super Crost 5415	5.7	14.8
Garst 8344	5.7	10.5	Super Crost 5460	6.3	12.3
Golden Harvest 533	7.0	13.6	Taylor-Evans 6988	7.3	14.0
Golden Harvest 2572	6.3	17.4	Taylor-Evans 7055	3.7	9.4
Golden Harvest 2583	5.7	15.0	Terra 1120	6.7	13.0
Great Lakes 685	4.3	9.2	Terra 1125	7.7	11.3
GroAgri 4176	4.0	11.9	Triumph 1595	5.7	14.3
Hawkeye 56	5.7	11.8	Triumph 1990	4.7	8.1
Hubner 3305	7.7	12.4	Triumph 8229	5.0	12.2
Hubner 3313	5.7	17.5	Wilson 1890	6.7	10.5
Hubner 3315	6.7	14.9	Zimmerman 727	3.3	13.9
Hyperformer 59	6.3	15.3	Pioneer Brand 3184 (R) <sup>b</sup>	5.0	8.0
Hyperformer 64	7.0	11.9	Fontanelle 6230 (S) <sup>c</sup>	7.0	15.2

<sup>a</sup> Leaf-feeding damage is a measurement of 1<sup>st</sup> generation resistance and rated on a scale of 1-9 in which 1=no damage and 9=heavy damage (1-5=resistant, 5.1-6.9=intermediate, and 7.0-9.0=susceptible). Stalk tunnelling is a measure of 2<sup>nd</sup> generation resistance where ≤10.4 in.=resistant, 10.5-12.8 in. = intermediate, and ≥ 12.9 in. = susceptible.

Least significant differences at the 5% level of probability were 2.0 for 1<sup>st</sup> generation leaf-feeding resistance and 4.7 in. for 2<sup>nd</sup> generation stalk tunnelling resistance.

<sup>b</sup> Check hybrid resistant to both generations of ECB.

<sup>c</sup> Check hybrid susceptible to both generations of ECB.