which were also more tolerant than hybrids of susceptible x susceptible or susceptible x tolerant lines.

We can conclude from these studies that some lines are quite susceptible and some are reasonably tolerant but none were resistant when Corynebacterium nebraskense cells are injected into the plants at the dose levels used. Crosses of susceptible x susceptible, susceptible x tolerant and tolerant x tolerant lines tend to be intermediate between their parents. Probably more than one major gene locus controls disease reaction, but no definite conclusions can be drawn at this time. Further refinement of techniques are essential and further studies are needed to establish the genetic nature of disease reaction on corn plants.

We can definitely conclude that the use of resistant lines and hybrids and the breeding of even more resistant ones seems to be the best way to avoid farm losses due to bacterial leaf freckles and wilt of corn in Nebraska.

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1. Growth regulator induction of parthenocarpy in maize.

Natural parthenocarpy in maize is a common occurrence on partially fertilized ears. Growth substances from pollen or developing seeds stimulates parthenocarpy in unfertilized ovaries. This was first noted by Jones (1920) and investigated by Mangelsdorf (1926). Britton (1947, 1950) artificially induced parthenocarpy with alpha-naphthaleneacetic acid applied through a thistle tube in the cob or topically to the exposed ovaries. He included indole-3-acetic acid, indole-3-propionic acid, indole-3-butyric acid and beta-naphthoxyacetic acid in the 1950 study, but did not continue their use because of low or irregular response. He also tried applications of NAA to the silk, but got no ovary response to that method of application.

In 1971 we applied a range of growth regulators to maize silks in the course of a larger study of fertilization. An early-mid season hybrid (PA-290) was used with at least three ears per treatment. All growth regulators (see Table 1) were applied at a concentration of 10,000 ppm in 95% ethanol. One cc of each was applied to fresh silk with a

Table 1

Growth regulators applied to maize silks as 10,000 ppm solutions in 95% ethanol

Name	Symbols
B-(2-Furyl)-acrylic acid	B Acrylic
2-4 Dichloro phenoxyacetic acid	2-4,D
3-Indole butyric acid	IBA
3-Indole propionic acid	IPA
Naphthalene acetic acid	NAA
2,4,5 Trichloro phenoxypropionic acid	2,4,5 TP
N_6 Benzyladenine	BA
N_6 Benzyladenine plus 2,4,5 Trichloro phenoxyacetic acid	BA + 2,4,5 T

hypodermic syringe. The silk was protected from contamination with a standard glassine ear bag and, following treatment, the glassine bag plus a Kraft paper bag. Controls received one cc of 95% ethanol. All ears were harvested when normally pollinated ears showed full ripe kernels and frost had damaged the foliage to the point of preventing further seed or fruit developments.

The results are given in Table 2.

Cob development was obviously linked to fruit development and the full normal cob length was not attained with less than 50% of the possible fruits showing development. Also, as noted by Britton (1950), fruits began development from the tip, not the base of the ear. Apparently a gradient of action is established and at some distal point this is not sufficient to stimulate fruit development.

Table 2

Results of growth regulators applied to maize silks. Results are averages of at least three ears per treatment.

Growth regulator	Cob development	Percent possible fruit development
B Acrylic	small	none
2-4,D	normal length	75 - 80%
IBA	none	none
IPA	medium length	25 - 30%
NAA	normal length	75 - 80%
2,4,5TP	normal length	90 - 100%
BA	normal length	85 - 90%
BA + 2,4,5T	normal length	85 - 90%

The 2-4,D group of compounds were the most effective in inducing parthenocarpic fruits. One possible explanation of this is that they can remain at higher concentrations in the plant because plants do not contain enzyme systems for the natural breakdown of 2-4,D compounds. Benzyladenine was also an effective stimulator, but showed no synergistic increase when combined with 2,4,5T.

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2. Peroxidase activity, β -glucosidase activity and phenolic levels in monogenic resistant (Ht) and susceptible (ht) maize tissues inoculated with Helminthosporium turcicum.

The Ht gene conditions chlorotic lesion resistance to northern corn leaf blight, the causal agent of which is Helminthosporium turcicum Pass. Post-inoculation levels of peroxidase, β -glucosidase and phenolics were determined in isogenic susceptible (ht) and resistant (Ht) genotypes at daily intervals for four days and again after a period of 9-10 days.

Peroxidase activity in resistant inoculated tissues increased on day 1, rose sharply through day 3, decreased on day 4 and was only slightly higher than healthy tissue on day 10. Activity of susceptible inoculated tissues increased on day 2 and continued to rise through day 4 and decreased at day 10 with the onset of lesion desiccation. Electrophoresis showed that three peroxidase bands were produced in both resistant and susceptible inoculated tissue extracts. The bands were not detected in healthy tissue. No peroxidase was detected in culture homogenates. Increased peroxidase activities appeared to be correlated with degree of cellular disruption brought about by the infective process and was not directly associated with monogenic resistance.

β -glucosidase activities in resistant and susceptible tissues also increased following inoculation and decreased with desiccation of susceptible lesions and slowing down of lesion expansion in resistant tissues. H. turcicum cultures were shown to produce large amounts of β -glucosidase indicating that increases following inoculation may be fungal in origin.

Total phenolics increased between day 1-4 in both resistant and susceptible inoculated tissues. However, phenolic levels 10 days after inoculation were substantially higher in resistant inoculated tissue, any amount of which could be related to phytoalexin production since its identity is believed to be phenolic in nature.

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