

## 4. Against Insects in Stored Grain

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**WE FORGET THAT NATURE** grew most of the present crops in a healthy, i.e. disease-free and pest-free, condition before they were taken over under domestication. Generally, plants in their natural or virgin condition (a) were in a pure stand; (b) had been growing at the same location for many years; (c) had accumulated much of their own residues as soil organic matter; and (d) yet were free from diseases and pests.

### Currently Contradicted

These four facts are under contradiction in present practice, when we (a) rotate crops; (b) transplant from anywhere to everywhere; (c) remove much and return little of the organic matter the crops produce; and (d) do not consider diseases and pests as sins of our own commission by our disregard of the required fertility by which virgin crops grow their own self-protection. Even present-day reference in print says "It is impossible to over-emphasize the importance of crop rotations to control diseases, maintain fertility, prevent erosion and maintain soil structure."

As evidence from practice, Sanborn Field of the Missouri Experiment Station at Columbia, Missouri, in its Plot Number 13, with a six-year rotation given no soil treatment since 1888, has the lowest inventory of soil fertility by various soil tests amongst its total of forty-some plots. That excessive depletion has resulted under a six-year rotation of corn, oats, wheat, clover, timothy, where the clover fail-

ure now for many years (and its close duplication by the timothy) represent more nearly three years under culture followed by three years of neglect to weeds for recuperation. Our misinterpretation of what we are doing to the soil in contrast to what Nature does is at the basis of our outcry against diseases and pests and our frantic war on them with powerful poisons. That the fertile soils can protect the crops is still an unknown. In practice we disregard that fact, and the old adage which says: "An ounce of prevention is worth more than a pound of cure".

### Experimental Trials

In some recent experimental trials, the theory that the self-protection via fertile soils against insects carries its effects into the seed as stored grain was put under test. Ears of maize of an hybrid variety grown on different soil treatments were put into storage. They were wrapped into cellophane with the ends left open for advent of the common insects of stored grain.

The grain fertilized with nitrogen only was susceptible to earlier and more damage by the lesser grain borer (*Rhyzopertha dominica*) than the same hybrid grain with nitrogen and phosphorus as soil treatments alongside. These stored grains were under observation for three years. During the latter half of the time, that grown with nitrogen only was completely damaged. During that time the same hybrid, grown with more complete nutrition with the treatments of nitrogen and phosphorus on the soil grow-

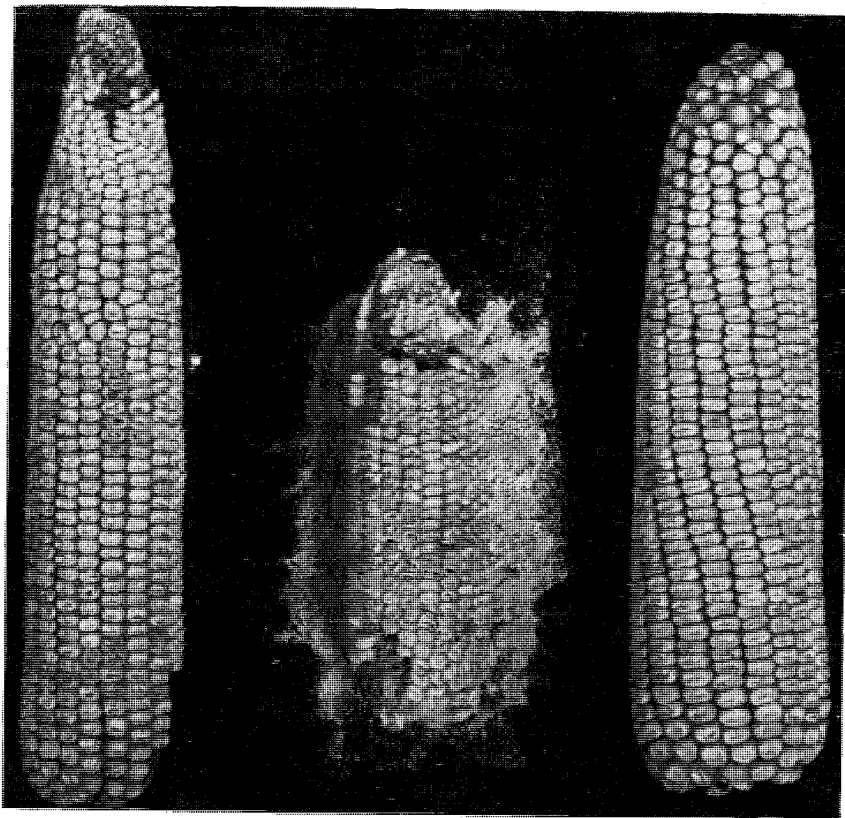


FIGURE 1. Hybrid maize grown on soil given nitrogen fertilizer only (center) was taken completely by the lesser grain borer. The same hybrid grown on soil given nitrogen and phosphate fertilizers (left) was attacked only at points of close contact with the center one. But the open-pollinated maize grown with barnyard manure only (right) was still immune to borers after contact for six months. (Missouri Agricultural Experiment Station, Columbia, Missouri)

ing it, was scarcely damaged, save where the ears were in close contact.

#### **Surprise to Many**

During the last six months of the test, some ears of open-pollinated maize, which had been grown on soil given only barnyard manure, were wrapped in contact with the two hybrids. It was a distinct surprise to many to find the grain of the former immune to the borer. The condition of the grain is exhibited in Figure I.

Such facts revealed to us by Nature's demonstrations certainly challenge the thinking which maintains the practice of fighting the diseases and

pests with powerful poisons. Should we not be trying to formulate a balanced fertility for plant nutrition that guarantees less plant diseases and fewer crop pests and thereby lets us escape the war on vermin and disease? Would not such a positive method surpass our war of using chemical poisons? Should not healthy plants grown with their natural ability to protect themselves do more to protect us humans with better health from nutrition than from drugs? Does not research in soil for nutrition and for health of plants offer much for all forms of life dependent on plants? ●