

BRIEF ARTICLES

**AN EARLY WILT AND RUSTY ROOT
PROBLEM IN CARROTS AT
THE BRADFORD MARSH**

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The Bradford Marsh is an area of approximately 8,000 acres of muck soil located about 50 miles north of Toronto. This area represents an important sector of the vegetable producing industry in Ontario. About 2,000 acres of this land is used for carrots and any threat to this crop is of considerable importance to the growers.

Historically, this problem was first brought to the attention of government and university personnel in 1962 when it occurred on two separate farms and was serious enough to cause some concern. Several persons were consulted but no one could identify the condition. The problem recurred in 1965, this time on several farms and with more extensive damage. Again, no one was able to identify the condition or suggest measures for control. Another outbreak occurred in 1968 causing extensive damage on a number of farms. During the years between these outbreaks the disease was comparatively mild and attracted little attention. The 1968 outbreak was undoubtedly serious enough to warrant an organized programme of study directed towards providing some of the answers.

Briefly, the problem can be described as follows: The first symptoms are noticed when the carrots are about 4 to 6 inches tall. The tops wilt during the day and recover at night. After several days of this intermittent wilting the older leaves begin to show signs of necrosis at the margins and the affected areas in the field become quite conspicuous because of leaf discoloration and reduced growth. Examination of the roots reveals various degrees of decay on the tap root, especially at the point of origin of branch roots, and also on the branch roots themselves. Affected roots tend to become distinctively rusty-red in color in the vicinity of the necrotic areas which appear flaky in texture. As the disease progresses and the amount of decay increases, plants begin to die, resulting in a reduced stand. However, if conditions for growth are good, the plants recover from these early symptoms and continue to grow and develop into a reasonably healthy-looking stand above ground. Below ground

the situation is somewhat different. The carrots formed are short and stubby, the lower portion of the root having failed to expand. Other carrots are forked and knobby. Many of these misshapen carrots produce excessive fibrous branch roots which hold the soil during harvesting operations. The "rusty root" symptom is evident on these fibrous roots throughout the growing season. In 1968 this condition was so bad that several acreages were disc'd-under at harvest time because the carrots were considered non-marketable.

In a few instances, growers had reseeded the carrots where the initial stand was badly affected. These reseeded areas resulted in stands that were sufficiently disease-free to be economically harvested. This suggests the possibility that temperature and moisture may be involved in the problem. There is also some indication of difference in varietal susceptibility but the evidence is insufficient for a recommendation at the present time.

Although several persons have attempted to diagnose the problem, its cause has not yet been established. A reliable diagnosis with appropriate recommendations for control will undoubtedly require a substantial programme of careful research. An effort is being made to establish such a programme.

**EFFECTIVE RANGE OF BASIDIOSPORES
OF GYMNOSPORANGIUM'**

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References to effective basidiospore dissemination of *Gymnosporangium* are often understandably vague (Palmiter 1953, Bernaux 1956), but MacLachlan (1935) has made a definite estimate of a range as great as 7 or 8 miles. Recent field evidence has led to the conclusion that basidiospores may be effectively disseminated for even greater distances.

In the fall of 1968, roestelia of *Gymnosporangium globosum* Farl. were very abundant on leaves of *Crateagus crus-galli* L. and *C. ?submollis* Sarg. along edges of pasture and mixed wood near Maberly, Lanark Co., Ontario. The rust was first observed at this site on September 9, when aecia were slightly past maturity, many of them having lost half their spore mass. The infection was so heavy that the alternate host was assumed to be

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