IPM AND FUMIGATION: HOST RESITANCE TO MANAGE PHYTOPHTHORA IN PEPPERS

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INTRODUCTION AND BACKGROUND: Peppers are an important component of the vegetable industry in North Carolina. North Carolina ranks 5th in pepper production with 7400 acres of peppers and an annual farm gate income of 15 million dollars. The leading states are California, Florida, Michigan and New Jersey. Profit limiting diseases include *Phytophthora* crown and root rot (PCRR; *Phytophthora capsici*), Southern stem blight (*Sclerotiorum rolfsii*) and root knot nematodes. PCRR is the number one disease of concern to the industry (Ristaino and Johnston, 1999). Up to 40-70% of plants within a field may become infected, wilt and die and inoculum can persist in the soil for long periods of time. On diseased plants, inoculum production increases and can be splash-dispersed by wind-driven rain to neighboring plants. In addition, the pathogen has a wide host range including tomato, eggplant and most cucurbits (e.g., cucumber, squash, pumpkins, and melons). Peppers are often grown in rotation with squash or cucumbers, and this particular production system is conducive to the build up of the pathogen. Control of *P. capsici* is a challenge because of the universal susceptibility of currently available pepper and cucurbit cultivars, and a lack of crop rotation options for our growers.

ROLE OF FUMIGATION: Methyl bromide fumigation in plastic-covered beds is utilized for a majority of fresh market production systems to manage nematodes, southern stem blight, weeds, and other soil borne pests. MB is not highly effective for managing PCRR (Figure 1A). The introduction of contaminated transplants, water, or soil may allow the pathogen to rapidly re-colonize the soil after fumigation. Many growers apply several applications of fungicides, including mefenoxam to manage the root rot phase and foliar phase. Ridomil alone can offer good protection (Figure 1B) but many fields are populated with insensitive strains resulting in failure of control (Parra and Ristaino, 2001). Grower experiences have shown that under heavy disease pressure, fumigants and fungicides are not effective at limiting economic losses.

Cultural control practices play a significant role in plant disease management. Crop rotation and cropping sequence contribute to Phytophthora management. Water management issues such as good drainage, no ponding in fields, judicious use of overhead watering and formation of planting ridges is essential to limit Phytophthora root and crown rot incidence.

The objective of this component research was to determine the utility of host resistance to manage PCRR of pepper. Future research would seek to integrate these strategies into future systems that may be developed and are not MB dependent.

SUMMARY OF RESEARCH: 'King Arthur' and 'Camelot' are the most common pepper cultivars grown due to their productivity and market acceptability. However, both are highly susceptible to PCRR (Figure 2). 'Paladin' offers superior resistance (Figure

1B; Figure 2) but has not been widely adopted by growers due to market acceptability issues. More recently, 'Aristotle' has been released and has superior resistance to PCRR (Figure 2), high market acceptability and good yields. Our program continues to evaluate pepper lines for their adaptability to NC production needs.

Fumigation has not proven effective for the management of PCRR and the implementation of alternatives would need to be complemented with PCRR management. Additional research is needed to evaluate alternative fumigants, fungicide products, and cultural practices, including the use of cover crops and biofumigation. This report highlights the role resistant varieties may play in an integrated cropping system as alternative fumigants and production practices are developed. Resistance to PCRR should be an effective IPM tool in fresh market pepper production systems. The durability of this resistance is not known and is dependent on more knowledge about the genetics of the host, pathogen, and the interaction of these organisms.

Figure 1A: TRIAL 1 - Effect of methyl bromide and Ridomil Gold on PCRR incidence in pepper.

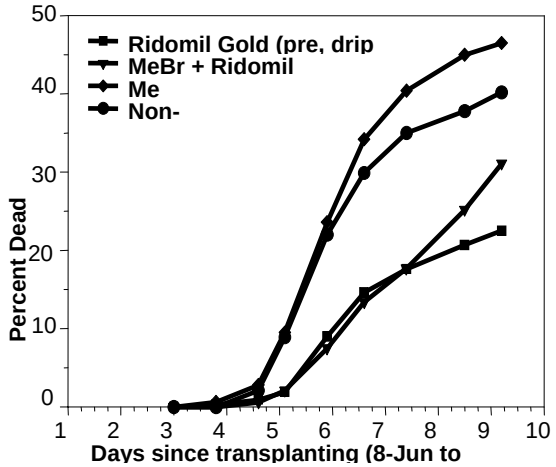

Figure 1B: TRIAL 2 - Effect of host resistance and Ridomil Gold on PCRR incidence in pepper.

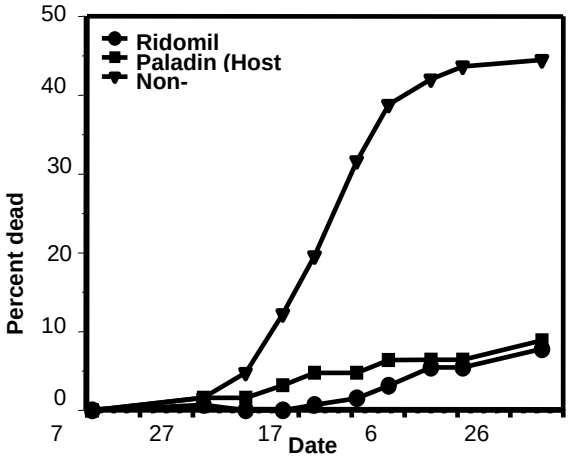

Figure 2