BENEFICIAL EFFECTS OF RHIZOBACTERIA ON GROWTH AND YIELD OF STRAWBERRY

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Bacteria were isolated from the rhizospheres and root tissues of strawberry grown in methyl bromide-fumigated and non-treated soils, as well as from bulk soil. Following fumigation, fluorescent *Pseudomonas* spp. quickly reached high populations in soil and on roots (3). Isolates were identified using the MIDI-GC Microbial Identification System and tested for antibiosis in cultures with *Verticillium dahliae, Phytophthora cactorum,* and species of *Pythium, Rhzoctonia, Fusarium, Cylindrocarpon,* and *Colletotrichum* isolated from strawberry. Many bacteria, especially *Pseudomonas* spp. from rhizospheres in fumigated soils, had antibiosis to one or more fungi, but few isolates inhibited *Pythium* sp. and *P. cactorum*. Among bacterial isolates, there was a correlation between antibiosis to one or more fungi and growth promotion of inoculated strawberry plants grown in natural soil under controlled conditions (2).

Bacterial isolates giving consistent growth benefits in strawberry under controlled conditions have been tested in the field (1,2). Three bed fumigation treatments were applied in 2000-01 at the U.C. South Coast Research and Education Center (SCREC), Irvine, CA, and in 2001-02 at the Monterey Bay Academy (MBA) near Watsonville, CA, i.e., a standard rate of methyl bromide with chloropicrin (MBC), chloropicrin at 200 lb/a (rates per treated bed area), and not fumigated. Sections of the ground used in 2001-02 at SCREC were fumigated with MBC, Vapam (70 gal/a), or were left untreated. Roots and crowns were inoculated at transplanting by dipping, and in some cases, plants were re-inoculated periodically as they grew (i.e., to mimic delivery of microbes by drip irrigation systems). Although soil fumigation usually had large effects, none of the inoculation treatments increased plant size or yield in MBC-treated soil, and some actually decreased berry yield. In nontreated soil, inoculation effects on yield were generally not significant, although some of the bacteria reduced the final incidence of Verticillium wilt at MBA. In contrast, on soil treated with chloropicrin or Vapam, a few isolates increased growth and yield significantly. Reinoculation during plant growth did not alter the effects of individual isolates relative to inoculations done only at transplanting. It appears that most of the bacterial inoculations in MBC-treated soil reduced yield somewhat while many of the same inoculation treatments increased yield significantly in the Pic- or Vapam- treated soils (1,2).

A more comprehensive experiment was done in 2002-03 at MBA. Fumigation treatments were applied to preformed beds and included shank applied MBC at

325 lb/a, drip applied chloropicrin EC at 200 lb/a, drip applied Vapam at 70 gal/a, and a nontreated control. Five isolates of bacteria were used to inoculate transplants, some which were beneficial in previous field experiments and some which had been tested only in the laboratory and greenhouse. The strawberry varieties Camarosa and Aromas were used. On MBC-treated soil, most isolates increased the berry yields of Camarosa but had small effects on the yield of Aromas. Bacterial effects on berry yields on chloropicrin- and non-treated soils were smaller than before in both varieties. On Vapam-treated soil, however, one isolate increased the yield of Camarosa and two isolates increased the yield of Aromas significantly.

Bacterial growth and yield promotion of strawberry following inoculation in the field was variable and depended on soil fumigation treatment, as well as isolate, strawberry variety, and probably location. We are continuing to further characterize bacterial isolates from strawberry with the greatest beneficial activities, and to further optimize bacterial colonization and yield promotion of strawberry in field experiments.

References Cited:

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