Integrated Biological Control of Poa annua

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Introduction: The purpose of these studies is to determine the effectiveness of integrating chemical and biological control agents to manage annual bluegrass (*Poa annua* ssp. reptans) maintained under fairway conditions. The biocontrol agent used in these studies is the bacterium *Xanthomonas campestris* (PAR 5). *X. campestris* is highly specific and causes the disease "bacterial wilt" only on annual bluegrass. The advantages of combining biological and chemical treatments would be reduced amounts of chemicals needed and also reduce the possibility that annual bluegrass will develop resistance to the chemicals and *X. campestris*. Field studies were conducted using *X. campestris* alone or with chemical herbicides or plant growth regulators. All studies are conducted for two consecutive growing seasons.

Study #1: The first field study includes *X. campestris* as the biocontrol agent alone or with varying rates of the herbicide Prograss or plant growth regulators such as X factor or Primo. Mycoshield was again applied as an antibiotic control. Summer 2000 is the second year of this two-year study. The treatments were as follows:

- Mycoshield — 2.5 lbs applied every 14 days
- *Xanthomonas campestris* (PAR 5) — 2.0 X10^7 CFU/ml applied 1 time/week
- Prograss — 1.5 oz/1000 sq.ft. applied every 21 days
- X factor — 0.05 oz/1000 sq.ft. applied every 28 days
- Primo — 0.25 oz/1000 sq.ft. applied every 28 days
- *Xanthomonas campestris* + Prograss
- *Xanthomonas campestris* + X factor
- *Xanthomonas campestris* + Primo

Study #2: The second field study includes *X. campestris* as the biocontrol agent alone or with varying rates of the herbicide Rimsulfuron. Mycoshield was again applied as an antibiotic control. Summer 2000 is the first year of a two-year study. The treatments were as follows:

- Mycoshield — 2.5 lbs applied every 14 days
- *Xanthomonas campestris* (PAR 5) — 2.0 X10^7 CFU/ml applied 1 time/week
- Rimsulfuron — 4g ai/acre at 0 week only
- Rimsulfuron — 2g ai/acre at 0 and 6 weeks
- Rimsulfuron — 1g ai/acre at 0 and 6 weeks
- *Xanthomonas campestris* + Rimsulfuron (2g ai/acre at 0 and 6 weeks)
- *Xanthomonas campestris* + Rimsulfuron (1g ai/acre at 0 and 6 weeks)

Conclusion: Data from these studies suggest multiple applications of *X. campestris* alone are capable of removing annual bluegrass without visible reductions in turf density. However, bacterial concentration and moderate drought stress appears to be important factors involved in its effectiveness. These studies suggest a trend in which control is enhanced using an integrated approach. Additional research involves enhancing the effectiveness of *X. campestris* to cause disease using a supplemented organic compound.