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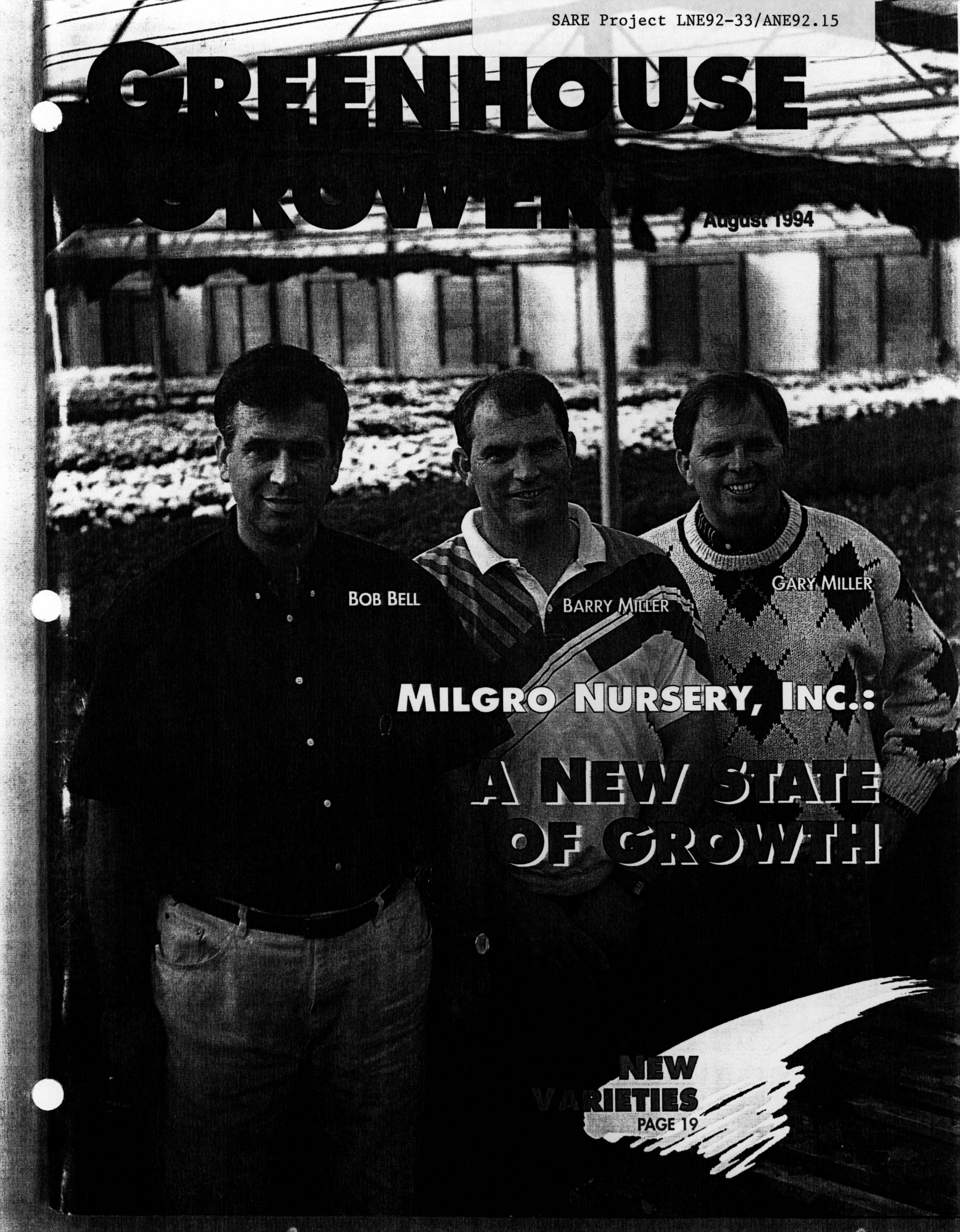
GREENHOUSE GROWER

August 1994



MILGRO NURSERY, INC.:

A NEW STATE OF GROWTH

NEW VARIETIES

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Fungi Only A Grower Could Love

Insect-killing fungi present viable greenhouse pest management options

by MICHAEL BROWNBRIDGE, DONALD L. McLEAN, MARGARET SKINNER, and BRUCE PARKER

THE need to develop effective, safe, biorational pest control alternatives has never been more pressing as the number of practical chemical control options has declined.

A wide variety of predators, parasitoids, nematodes, and bacteria is now available or under development for control of the major greenhouse pests. But the most promising and versatile microbes for management of sap-feeding insects of significance, such as thrips, whiteflies, and aphids, are probably entomopathogenic fungi.

Inconsistent results were obtained in early attempts to control insect pests with fungi, largely due to insufficient understanding of the biology of both host and pathogen. Because we now have better knowledge of the intricate relationship between the two, and because advances have been made in mass production and formulation technologies, we can reexamine the role mycopathogens may play in pest management strategies.

For short-term greenhouse crops, fungi could be used as mycoinsecticides – applied with the aim of maximizing insect infection and mortality rates from each treatment.

However, their successful development requires extensive research to ensure the availability of effective

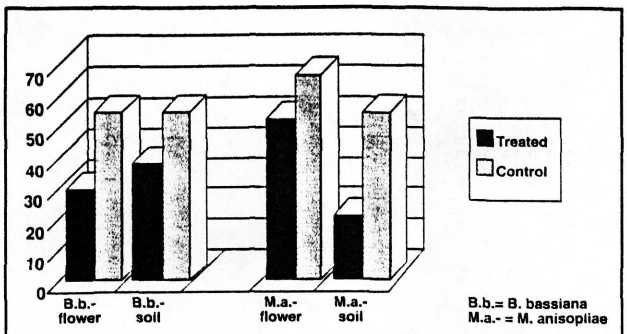

Figure 1. Surviving thrips population following flower or soil treatment with fungi.

products that are amenable to a commercial greenhouse operation.

Developing Insect-Killing Fungi

At the University of Vermont, we are targeting investigations to develop indigenous fungal entomopathogens as viable biocontrol agents against three major greenhouse pests: Western flower thrips, sweet potato whitefly, and green peach aphid.

Selective laboratory bioassays have provided several highly virulent fungal strains for use against individual pest species, as well as strains with a broader spectrum of activity. Small-scale greenhouse trials are underway to determine their efficacy against Western flower thrips on chrysanthemum and sweet potato whitefly on poinsettia. Results of some of these trials follow.

Western Flower Thrips. Because these insects are found in two distinctive habitats – media and flowers/foliage – at different stages of their life cycles, we studied the potential of the fungal strains to control thrips in both environments.

Western flower thrips could be readily infected from topical application of a fungal preparation or by picking up spores from a treated leaf surface. But what about resident pest populations in the harder-to-reach environs such as flowers and media?

Figure 1 shows the effect of two fungal treatments, *Beauveria bassiana* and *Metarhizium anisopliae*, on survival of Western flower thrips in flowers and media. The surviving thrips population in flowers treated with *B. bassiana* was around 47% lower than in control plants. *M. anisopliae* was more effective when applied as a media drench, and the surviving population was about 72% lower than in control plants. This highlights the importance of strain selection according to the chosen management strategy, targeting either media- or flowers/foliage-inhabiting stages of insects.

These results were obtained after a single fungal application against a thrips infestation. Improvements in timing and method of application, formulation, and dose rates will no doubt enhance the fungi's performance. The persistence and long-term efficacy of media treatments involving popular potting mixes are also being investigated.

Sweet Potato Whitefly. Whitefly generations overlap in an established greenhouse infestation, so it would be desirable if fungal agents used to fight

them were effective against as many developmental stages as possible. Our studies showed that nymphs and adults are susceptible to the fungi, but eggs are generally quite resistant.

B. bassiana, Paecilomyces fumosoroseus, and *Verticillium lecanii* consistently demonstrated the highest levels of activity in our early trials. Selected strains are now being tested against whitefly on poinsettia.

Higher whitefly mortality levels were obtained using a *B. bassiana* isolate formulated in oil than one formulated in the surfactant Tween (65% vs. 39%), probably as a result of the superior leaf and insect coverage.

Further research will determine which formulations are most suitable for the fungal strains being tested.

Green Peach Aphid. Because of aphids' high reproductive rates, fungi were evaluated by ability to rapidly kill the treated adult pest population, reduce number of offspring produced, and spread within the offspring population. *V. lecanii, B. bassiana*, and *M. anisopliae* isolates did the best jobs.

We are conducting further research to develop isolates that perform well in each category.

Western flower thrips infected with *B. bassiana*.

Looking Ahead

More research is needed about the effects of dose rates, timing of application, droplet size, and efficacy. The fungi must be mass produced and formulated into products that remain stable during storage and application and that can be readily mixed and applied with conventional spray equipment.

Side effects of materials used to formulate the fungi (such as phytotoxicity or insecticidal activity) also need to be known. Ultimately, the compatibility of the fungi with other control tactics – biological and chemical – and plant production practices must be evaluated to develop guidelines for the use of these fungi in IPM.

Research results with fungi to date have been encouraging. Their development as dependable, inexpensive components of IPM will significantly reduce reliance on chemicals. **GG**

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