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A GROWING SUBSTRATE FOR REARING BULK POPULATIONS OF HESSIAN FLY IN SELECTION OF RESISTANT WHEATS

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ABSTRACT: The use of an appropriate growing substrate for wheat plants is important for mass production of Hessian fly pupae. Potting soil (1/3 sand, 1/3 peat moss, and 1/3 top soil) was compared with a peat-lite mix, a commercial mixture of shredded peat moss and vermiculite. The number of Hessian fly pupae produced doubled in the peat-lite mix, perhaps due to better aeration and a more stable moisture level in the growing medium.

INTRODUCTION

The medium selected for growing wheat seedlings to be infested with Hessian fly (HF), *Mayetiola destructor* Say (Diptera: Cecidomyiidae), is very important for the mass production of larvae in the greenhouse for testing wheat lines for resistance to specific biotypes of this insect (Foster, *et al.,* 1988). A greenhouse test was conducted to evaluate the effectiveness of the two soil types as rearing media for HF larvae.

MATERIALS AND METHODS

An experiment was conducted for testing the effect of the soil substrate on the Hessian fly. Twelve greenhouse flats were seeded with wheat cv. "Monon" and were infested with HF biotype E. A potting soil (1/3 sand, 1/3 peat moss, and 1/3 top soil) was used in six flats, and a commercially available growing medium (JiffyMix$^{(R)}$) consisting of shredded peat moss and vermiculite was used in the other six.

The wheat seedlings were infested with HF when they were at the 1-2 leaf stage (see Foster, *et al.,* 1988). One hundred seedlings were then sampled at random 21 days after infestation on each medium. The pupae per plant were counted and measured.

RESULTS AND DISCUSSION

The mean number of pupae per plant and the mean pupal size are presented in Figure 1. The number of pupae per plant was 8.24 on the commercial mixture, compared with 4.10 on the traditional potting soil mixture. The mean pupal size, however, was similar for wheat seedlings growing on either potting soil or peat-lite mix.

The mean number of pupae per plant were also grouped into frequency classes (Fig-

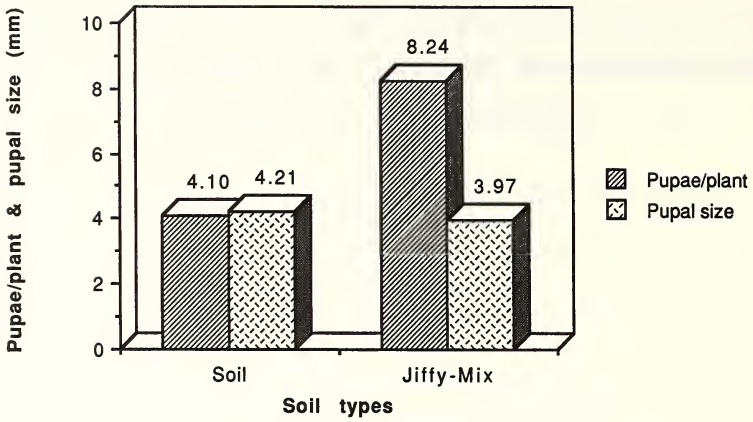

Figure 1. Numbers of pupae per plant and pupal size (mm) obtained from Hessian fly-infested wheat seedlings growing on potting soil or on peat-lite mix.

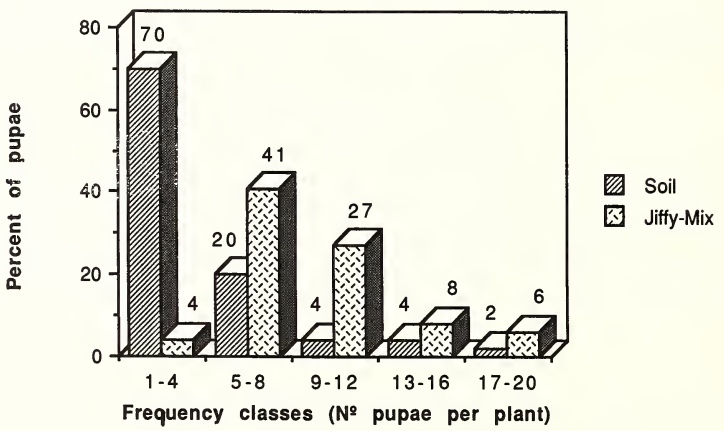

Figure 2. Frequency distributions of the numbers of pupae per Hessian fly-infested wheat seedling growing on potting soil or on peat-lite mix.

ure 2). Most plants grown on the potting soil had 1-4 or 5-8 pupae per plant (70% and 20%, respectively), but most seedlings grown on the commercial substrate had 5-8 or 9-12 pupae per plant (41% and 27%, respectively). The greater survival of the larvae on the peat-lite mix is illustrated by the fact that only two plants in potting soil had more than 17 pupae each, while six seedlings in the commercial medium had more than 17 pupae each.

Although the mean pupal sizes were similar in plants from both treatments, they were also grouped in frequency classes (Figure 3) in order to visualize possible differences among treatments. Most plants on potting soil had pupae measuring 4.1-4.5 mm, but most plants on the peat-lite mix had pupae measuring 3.6-4.0 mm.

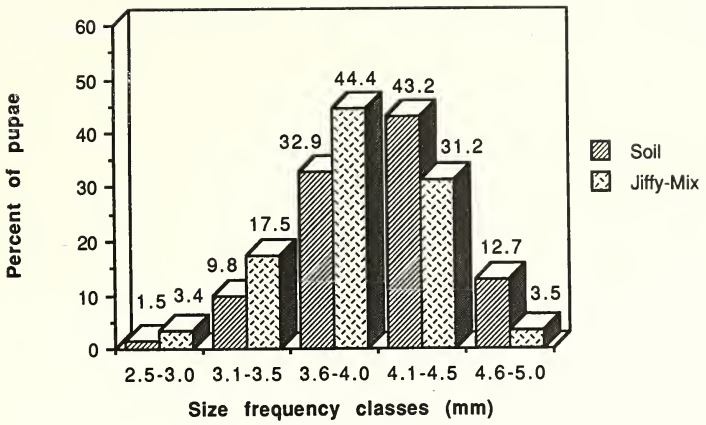

Figure 3. Frequency distributions of the size of pupae from Hessian fly-infested wheat seedlings growing on potting soil or on peat lite mix.

The increase in the number of pupae on seedlings grown on the peat-lite mix compared to the potting soil may have been due to the more stable moisture level in the growing medium. The commercial peat-lite mix required about half the time for watering the flats, since the moisture was maintained for longer periods of time. The increase in the number of pupae on this treatment may have also tended to shift the predominant pupal size towards relatively smaller pupae.

These results warrant further study. The increased production of bulk populations of HF biotypes could represent savings of as much as half the materials and space required traditionally. Also, when sifting the potting soil from infested wheat plants, a number of puparia are dislodged or crushed. The combined growing substrate, however, does not require sifting, which is replaced by trimming the seedlings 1 cm above the growing medium. Another possible direction for research is to study the effects of pupal sizes on fly emergence or on the HF male:female ratio as related to wheats with varying degrees of plant resistance to this insect pest.

DISCLAIMER

Mention of a proprietary product in this article does not constitute an endorsement or a recommendation for its use by the Department of Entomology, Purdue University.

LITERATURE CITED

Foster, J.E., J.E. Araya, G. Safranski, S.E. Cambron, and P.L. Taylor. 1988. Rearing Hessian flies in selection of wheat cultivars for fly resistance. Purdue Univ. Agr. Exp. Sta. Bull. 536, 16 pp.