ABSTRACT

Eastern filbert blight (EFB), caused by the pyrenomycete Anisogramma anomala, is a serious threat to the hazelnut industry in the Pacific Northwest. The fungus is endemic in the eastern United States where it occasionally produces small cankers on the wild American hazelnut (C. americana). In contrast, most cultivars of the commercially important European hazelnut (C. avellana) are susceptible. Recommended cultural practices including scouting, pruning out infected branches, and fungicide applications slow disease spread but are expensive. Genetic resistance is the most promising control method. Recent OSU releases carry a dominant allele for resistance from 'Gasaway'. However, 'Gasaway' and some of its offspring have been infected by isolates from New Jersey, Minnesota, and Michigan. There is an urgent need to find and study new sources of resistance. We investigated 12 new sources of EFB resistance: 'Grand Traverse', C. heterophylla 'Ogyoo', 'Yoder #5', C. americana 'Rush', 'Uebov' and seven selections from a Forestry Institute in Moscow, Russia. Seedling populations segregating for resistance were inoculated by either exposure of potted trees under a structure topped with diseased branches or greenhouse inoculation. DNA extracted from these seedlings was amplified with primers for microsatellite markers on linkage group 6 (LG6). For structure inoculated progenies, resistance from 'Grand Traverse' and C. heterophylla 'Ogyoo' was assigned to LG6, resistance from 'Yoder #5' was assigned to LG7 while 'Rush' was linked to markers from both LG2 and LG7. Similarly, greenhouse inoculated 'Uebov' progenies were mapped to LG6. Seven Moscow selections that remained free of EFB following greenhouse inoculation were crossed with susceptible parents and ~60 seedlings of each progeny were inoculated in the greenhouse. Very few seedlings of Moscow selections N01, N01-06, and N01-07 remained free of disease and were likely escapes. In contrast, seedlings of Moscow selections N23, N26, N27 and Moscow N37 segregated in a 1:1 ratio, indicating control by a single locus and a dominant allele for resistance. Resistance from Moscow N27 appears to be on LG2, while resistance from N23, N27 and N37 were not significantly correlated with any of LG6, LG2 and LG7 alleles. These three Moscow sources are unique sources of EFB resistance. Resistance from these new sources will be mapped, and linked markers developed and used in pyramiding different resistance genes for durable EFB resistance.

INTRODUCTION

Commercial cultivation of European hazelnuts (Corylus avellana L.) in Willamette valley is threatened by fungal disease eastern filbert blight (EFB) caused by the pyrenomycete Anisogramma anomala (Peck) E. Müller. 'Gasaway' was found to be resistant to EFB and the resistance mechanism study identified a single locus with a dominant allele for resistance. 'Gasaway' have been extensively used in OSU breeding program and several recent releases carry a dominant allele for resistance from 'Gasaway'. However, 'Gasaway' and some of its offspring have been infected by A. anomala isolates indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection indicating urgent need to investigate new sources of resistance and incorporate these new resistance sources into the upcoming releases. Identification, studying, and mapping of new resistant selection. Identification, studying, and mapping of new resistant selection.

MATERIALS AND METHODS

- Progenies segregating for resistance from four sources ('Grand Traverse', C. heterophylla 'Ogyoo', 'Yoder #5,' and C. americana 'Rush') were exposed to EFB under a structure topped with diseased wood.
- Seedlings representing seven Moscow selections (N01, N01-06, N01-07, N23, N26, N27, and N37) were inoculated in the greenhouse.
- 3 scions for each seedlings of 'Uebov' progenies (07024, 08035) were grafted and inoculated in the greenhouse.

RESULTS AND DISCUSSION

For all resistance sources studied, resistant parents did not show any symptoms of disease while the susceptible parents developed cankers. Very few seedlings of Moscow selections N01, N01-06, and N01-07 were resistant and were likely escapes. 'Grand Traverse', C. heterophylla 'Ogyoo', 'Yoder #5', C. americana 'Rush', 'Moscow N23', N26, N27, and N37 segregated in 1:1 ratio, indicating resistance governed by a single locus and a dominant allele for resistance. While 'Uebov' segregating in 1:3 ratio is likely due to 2 heterozygous loci involved in resistance expression and susceptible are recessive at both loci. Resistance for 'Uebov' and 'Grand Traverse' are mapped to LG6. Similarly, 'Yoder #5' is assigned to LG7, 'Moscow N27' to LG2, while 'C. americana 'Rush' is linked to markers from both LG2 and LG7. Resistance from other Moscow selections N23, N26, and N37 did not co-segregate with either of LG6, LG7, and LG2 markers, and has not been assigned to LGs, but seems to be completely new resistance sources at different LGs.

REFERENCES