Section VI.
Vectors of Plant Pathogens

APHIDS AND BARLEY YELLOW DWARF VIRUS IN GRASSES GROWN FOR SEED IN THE WILLAMETTE VALLEY

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Barley yellow dwarf virus (BYDV) infects more than 100 (Poaceae) species of cultivated and wild grasses, including fescue, ryegrass, and blue-grass. The virus is known to reduce yields up to 25% and is a problem world-wide on cereals, barley, oats, and wheat. Effects of BYDV on grass seed crop yields are not well documented as in the cereal crops. The BYDV is systemic within plants, and once perennial grass plants are infected by this virus, these plants remain infected for the duration of their lives. Some plants may not show symptoms of infection and do not seem to be adversely affected. . However, seeds produced by infected plants do not carry the virus and volunteer plants from these seeds will not be infected unless they are inoculated with BYDV by **APHIDS**. The cool summers and mild winters in these regions provide an ideal environment for maintaining aphid populations on host plants throughout the year.

Known Aphid Vectors of BYDV

Aphid species transmit different isolates of BYDV	Strains
*1. *Rhopalosiphum padi* = Bird oat-cherry aphid	RPV
*2. *Sitobion avenae* = English grain aphid	MAV
3. *Metopolophium dirhodum* = Rose grass aphid	PAV (non-specific)
4. *Rhopalosiphum maidis* = Corn leaf aphid	RMV

BYDV is transmitted from plant to plant ONLY by aphids as they feed. In Oregon, the aphids that may vector BYDV include the bird cherry-oat aphid, rose-grass aphid, English grain aphid, corn leaf aphid, and the green bug. Aphid flights were monitored weekly using yellow water traps in establishing and established fields. Seasonal migrations of aphids can move BYDV over large geographic areas.

In-field spread of BYDV occurs when infected apterous aphids crawl or winged (alate) aphids fly to healthy plants and introduce the virus into the phloem while feeding. Berlese funnels containing grass cores and sweep-netting foliage were used to monitor for presence of aphids within the field. Grasses with symptoms were surveyed and randomly-collected tiller samples were tested for BYDV virus by ELISA testing (Table 1, Table 2, Table 3).

Table 1. No. of positive-tested plants with BYDV in newly establishing rye fields. Preliminary data presented; 4 transects/~20 plants =~80 plants. Ocamb08

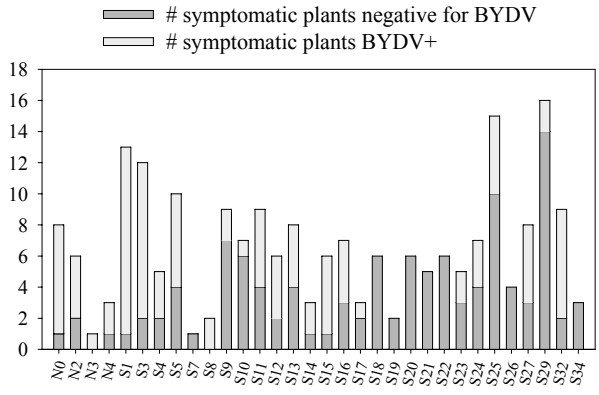
"New" Fields	June 2008 # BYDV PAV^+ plants	June 2008 # BYDV RPV^+ plants	Sept 2008 # BYDV PAV^+ plants	Sept 2008 # BYDV RPV^+ plants
JL4	2	2	0	1
JL8	15	1	6	0
JL15	17	24	20	9
BL4	1	5	6	2
BL11	9	6	1	0
BL17	19	21	10	0

Table 2. No. of positive-tested plants with BYDV virus in older perennial rye fields. Preliminary data presented; 2 transect/50 plants = ~90 plants. Ocamb08.

"Old" Fields	Field Age	May 2008 # BYDV PAV^+ plants	May 2008 # BYDV RPV^+ plants
BL5	1^{st} yr	8	17
BL6	1^{st} yr	1	12
BL8	1^{st} yr	57	4
BL2	2^{nd} yr	26	16
BL9	2^{nd} yr	66	53
BL14	2^{nd} yr	29	24

Preliminary Data: 2 transects/~50 plants = ~90 plants; C. Ocamb 2008

Table 3A/B. Plants with symptoms that appeared to be BYDV, which tested negative for BYDV.



Willamette Valley perennial ryegrass fields surveyed during 2008

Code	Field-Age	Location	Mean % Incidence of BYDV Symptoms
A	14 - 2^{nd} yr	Green valley	0.3
B	6 - 1^{st} yr	Green valley	4.5
C	5 - 1^{st} yr	Lindsay	5.8
D	2 - 2^{nd} yr	Church	7.8
E	9 - 2^{nd} yr	Kendall East	10.3
F	8 - 1^{st} yr	Kendall West	21.3

In order to prevent the virus from entering the plant, aphid vectors must be controlled. Therefore, two replicated randomized block studies were initiated on establishing perennial grass fields where insecticides were applied during the Fall aphid flight in 2008. It is critical to protect plants at emergence and during the seedling stage, as yield losses from BYDV in cereals was shown to be directly proportional to the age at which the plant is infected.

Three treatments were applied the morning of October 9th, 2008. Each plot measured 250 x 105 feet and 300 x 105 feet. Liquid products were delivered in the equivalent of 100 GPA with a grower-applied tractor at 50 psi using a 20 nozzle boom with TJ8005 nozzles that covered a 70ft swath. The boom spray was situated 36 inches above the ground. Aphid control will be measured by comparing numbers of aphids present in each plot by a unit measure of row (visual assessment), sweep net (10 samples of ten, 180° arc), and by taking 6-inch cores of grass per plot and placing in laboratory Berlese funnels for extraction of aphids. BYDV incidence will be documented and yield per plot will be taken.The 2008 aphid flight is shown in Fig. 1 below.