

Aster yellows Q&A

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Aster yellows in canola

The Canola Council of Canada agronomy team came up with the following 10 questions about aster yellows. Chrystel Olivier, research scientist with Agriculture and Agri-Food Canada in Saskatoon, answered them the best she could, given what is currently known about the disease.

1. Are there differences between varieties when it comes to aster yellows (AY) severity? If yes, do we know if this represents some genetic resistance?

So far, no canola varieties are known to be resistant to AY, but based on field observations during the past 15-20 years, *B. rapa* seemed to be more susceptible to AY compared to *B. napus*, *B. juncea* or *S. alba*. However, no laboratory work was done to investigate the cause of the difference in susceptibility.

This summer of 2012, differences in the percentage of plants expressing symptoms were observed between cultivars for *B. napus* and *S. alba*, in the AAFC experimental nursery (small plots). No laboratory work was conducted to explain the difference between the percentages of symptomatic plants.

Note: Trials in small field plots at the AAFC farm showed differences in the percentage of AY-infected plants between lines of *Camelina sativa*. Insect sampling revealed that there were fewer

leafhoppers in the lines showing few (or no) AY symptoms, as compared to the other lines. These results seem to suggest that feeding preference from the leafhopper might influence the percentage of AY infection among the plants. These results, although promising, need to be taken carefully as feeding preferences might not have a major impact on AY infection in large field acreage.

2. Can infected seed carry aster yellows on to the next generation?

It has always been admitted that phytoplasmas could not spread via seeds. However, phytoplasma DNA was found in seeds and/or embryos of several plant species in Canada (*B. rapa*, *B. napus*), Europe (*B. rapa*, tomato and corn), Oman (alfalfa), Africa (Coconut palm), Peru (corn) and Asia (mulberry). In most cases, phytoplasma DNA was found in the embryos and the early seedling stage. The exception is alfalfa where one seedling out of the 84 tested grew with phytoplasma symptoms. Recently, several articles in Europe started to mention that “a low percentage of seed transmission should be considered for phytoplasma”.

3. Can perennial weeds provide an overwintering bridge for aster yellows? If yes, which weed species are more likely to have the disease? And what is the likelihood that the disease will transfer from weed to crop next year?



Overwintering dandelions can be a host for aster yellows phytoplasma.

AY phytoplasma can be transmitted by several leafhopper species (the main vector *Macrostelus quadrilineatus* and at least 7 other species). AY can also infect more than 200 plant species, including some very common weeds such as dandelion and shepherd's purse, most pasture grasses and common shrubs and trees such as raspberry, willow and chokecherry. Phytoplasma will overwinter in roots of perennial plants as well as in aerial parts of fruit trees. Phytoplasma will also overwinter in the body of their leafhopper vector, when the overwintering stage of the leafhopper is the adult or larvae stage. Therefore, perennial weeds and plants growing are potentially a strong disease reservoir for phytoplasma and the likelihood of AY being transmitted from the reservoir to

the crop is high. However, no study has been conducted to know the extent of the infection among the perennials weeds and plants. Studies in carrot crops in the U.S. showed that weed management is important to reduce leafhopper population.

4. Some growers claim that insecticide applied for other insects also seems to have reduced aster yellows. Is this possible? If yes, what can growers do to achieve this benefit the next time we have a leafhopper/aster yellows outbreak?



Aster leafhopper Source: Chrystel Olivier, AAFC

In order to have successful spraying, insecticides should be applied very quickly after the migratory leafhoppers arrive, as leafhopper can transmit AY in less than 8 hours (3 hours for 3 leafhoppers per plant is the usual threshold in the lab). If you look at the south wind dates provided under question 9, you'll see that leafhoppers could arrive very early in season. Systemic insecticides are known to be effective in preventing disease transmission, however, no study has been done on field canola.

5. The disease survey counts only plants with bladder pods as having aster yellows. Is it true that for every one plant that tests positive for bladder pods, 2.5 are positive by PCR. If incidence is 10% by visual survey, it will be 25% by PCR. Is this ratio specific to this year or historical?

PCR tests show that actual levels of aster yellows infection are much higher than what a visual assessment of bladder pods would suggest.

6. Is this statement correct? 30-60% of seeds are usually lost in aster yellows infected plants, but this year seed loss was significantly higher.



Aster yellows can cause misshapen and malformed seeds, which often shrivel up and blow out of the combine. These can occur in pods that otherwise look normal.

7. Are the offspring of leafhopper carriers also carriers? Can phytoplasma transfer generation to generation in the insect?

The main AY vector, *Macrostelus quadrilineatus*, does not transmit AY via the eggs, therefore offspring do not carry phytoplasma. According to the literature, the other common leafhopper species that transmit AY in the Prairies have never been reported as being able to transmit via eggs. However, *Scaphoideus titanus*, a leafhopper present in the Prairies in very low number can transmit AY via eggs. Two other leafhopper species can transmit phytoplasma via eggs, but they are exotic leafhopper species transmitting exotic phytoplasma strains.

8. What are the key management techniques growers can follow to reduce severity of the next outbreak?

This is difficult to answer, as we don't know all the parameters and players involved in the AY epidemiology. An easy way to reduce the incidence would be to reduce the level of weeds in the fields, as it gives leafhoppers food choice.

So far, there is no economic threshold for canola, and no resistant cultivars. If spraying is the grower's choice, it will need to be very timely (i.e., just after the leafhopper arrival), otherwise, it is not effective.