Potato Progress

Research and Extension for Washington's Potato Industry
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First report of *Pratylenchus penetrans* damage to Ranger Russet in Washington

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The root lesion nematode, *Pratylenchus penetrans* is a common pathogen of potato east of the Rocky Mountains and frequently interacts with *Verticillium dahliae* to increase symptoms of early dying and decrease yield (1). West of the Rocky Mountains, *P. penetrans* is associated with numerous crops including mint, tree and small fruits, but is rarely recovered from potato fields. *Pratylenchus neglectus* is common in potato in the west but causes little loss in yield and does not strongly interact with *V. dahliae* (2). Management of *P. neglectus* is generally unnecessary, although a population of *P. neglectus* from Ontario, Canada appears to be more pathogenic and does interact with *V. dahliae* (2). During 2003, two fields of Ranger Russet in the southern Columbia Basin of WA had large areas of stunted plants, evident from ground examination and aerial photographs. Lower roots and stolons had numerous dark lesions typical of *P. penetrans* damage and were severely stunted, while atypical formed roots near the surface were long and white. Extraction of soil and roots in early May recovered 65 lesion nematodes/250 g dry soil and 810/g fresh root weight and the nematode was identified as *P. penetrans*. The crop responded to oxamyl (applied between early May and mid July) but the grower estimated that yields were 4 tons/ac less than in comparable unaffected fields. This is the first report of severe damage to potato from *P. penetrans* in the Columbia Basin potato production area. Since the only nematode recovered from preplant samples was *Pratylenchus* spp., assumed to be *P. neglectus*, and because Ranger Russet is relatively tolerant to *V. dahliae*, no fumigant was used in these fields. Rapid increase in mint production in this area may be responsible for introducing *P. penetrans* into previously uninfested fields since mint is propagated vegetatively and lesion nematodes are commonly associated with, and could be easily spread in, planting material and adhering soil. Identification of *P. penetrans* in stunted corn from two nearby fields during 2004 suggests that this nematode may be a new and emerging problem in this area. The Pacific Northwest is the largest potato-producing region in the United States and widespread introduction of *P. penetrans* could have a substantial impact on potato production in this area.

Reference (1) R.C Rowe and M.L Powelson. Plant Dis. 86:1184-1193., (2) S.L. Hafez et al. Nematropica 29:25-36, 1999.

Tuber Moth Trap Catch On Decline

Tuber moths are still active throughout the area, but trap catches are beginning to decline. This is expected, as evening temperatures are starting to be cooler than the moth needs for active flight. Of course it is still plenty warm during the day for larvae to develop, damaging any tubers they have already infested.

The moth has been confirmed to be feeding and reproducing on volunteer Shepodies north of Pasco. The importance of this for next season is not yet clear – we don't know for sure how the moth overwinters. Tuber moth can also be found, in infested areas, on tubers left after harvest. It appears that this insect is yet another way that volunteer potatoes will be important to our industry.

See the most recent tuber moth pheromone trap catch numbers in Oregon and Washington at the WSPC web site:

http://www.potatoes.com/research.cfm

Reminder: 2004 Mustard Green Manure Field Day, October 26th

If you missed previous field days or have attended before but want to hear the basics again, come to this year's event. The 2004 mustard green manure field day will be held Tuesday, October 26th, 10 am at the Dale Gies farm, 1.5 miles west of Rd M on Rd. 5 SE. We will cover the potential benefits and the basics of mustard management, what we do and what we don't know. In addition, field plots of mustard varieties will be available for comparison. Contact the Grant/Adams Extension office 754-2011 ext. 413 if you need more information. Andy McGuire (amcguire@wsu.edu).

Potato Commission Research Funding

The potato commission's annual research proposal and review season is fast approaching. Following is the research proposal and review schedule:

1. All proposals due: November 15, 2004.
2. Preliminary Research Review (Moses Lake): December 13, 2004.
3. Revised "new" proposals and progress reports due: January 15, 2005.
4. Final Research Review (Pullman): February 10-11, 2005.

Any and all industry members are welcome to attend the research review meetings in December and February.

Nutrients in Potato: Carotenoids

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Among the natural compounds present in the potato tuber are various carotenoids. There are many types of carotenoids in the plant kingdom. They are important for the animals that eat plants and accumulate in the animal tissues. The red color of shrimp and the pink color of salmon are due to carotenoids that they have obtained originally from marine algae that synthesized them. Carotenoids are generally yellow to red in color. White and yellow flesh potatoes have several types of carotenoids called xanthophylls, and the intensity of yellowness of the flesh is a good predictor of concentration. Two of the most important xanthophylls are lutein and zeaxanthin. Both of these accumulate in the human retina. Lutein and zeaxanthin have been shown to have beneficial effects in the retardation of macular degeneration and cataracts. Lutein and zexanthin have two functions in humans: 1) they serve as a light filter, able to absorb energy-rich blue light at the surface of the retina (the macula), and 2) they are antioxidants, capable of scavenging harmful free radicals. It is recommended that 6 to 14 mg of lutein be consumed per day to achieve this kind of therapy. Beta-carotene is a well-known carotenoid which is a precursor to vitamin A. Potato has only traces of beta-carotene. However, the xanthophylls are important in their own right. In Table 1 the total carotenoid contents of several different classes of potatoes are presented.

The white flesh potatoes that are most familiar to the U.S. consumer have between 50 and 100 micrograms per 100 g fresh weight. Yellow flesh potatoes are just beginning to take over a market share in the U.S., but they are the primary flesh type in the rest of the world excluding a few countries like Canada, Great Britain, Egypt, and Uruguay. The yellow color is caused by two to three times as much carotenoid. For instance, Yukon Gold, a yellow flesh potato that many people in the U.S. have tried, has 194 micrograms per 100 g FW. In South America a class of potato cultivar called very simply Yellow Potato (Papa Amarilla) has very high concentrations of carotenoids. So far there are only breeding lines available that were selected from crosses with this South American genetic stock. In Table 1 they are shown as the dark yellow flesh types. Although these values are high, there are selections from crosses involving South American yellow potato cultivars that have up to 2,200 micrograms per hundred grams fresh weight. The potential of developing potato varieties with super high levels of carotenoid therefore exists.

Table 1. Total carotenoid content of some potato culitvars and breeding lines.

Cultivar or Breeding Line	Skin/ Flesh Type	Total Carotenoid :g / 100 g FW	Significance
Light Yellow flesh cultivars and breeding lines			
Adora	W/Y	227	cdefg
Divina	W/Y	271	cdef
Fabula	W/Y	179	cdefg
Ilona	W/Y	176	cdefg
Morning Gold	W/Y	101	defg
Provento	W/Y	191	cdefg
Satina	W/Y	248	cdefg
Yukon Gold	W/Y	194	cdefg
POR00PG4-2	W/Y	250	cdefg
Dark Yellow flesh breeding lines			
91E22	W/DY	795	a
PA99P11-2\w	PR/DY	509	b
PA99P1-2\w	PR/DY	525	b
PA99P2-1\w	PR/DY	738	a
POR00PG4-1	W/DY	634	ab
White flesh cultivars and breeding lines			
Norkotah	RT/W	40	g
Ranger	RT/W	71	efg
Burbank	RT/W	58	fg
A8893-1	RT/W	56	g
A9014-2	RT/W	55	g
A90586-11	RT/W	99	defg
A9045-7	RT/W	64	efg
A90490-1	RT/W	101	defg
A91790-13	RT/W	75	efg
A92030-5	RT/W	54	g
A93157-6LS	RT/W	66	efg

DY = dark yellow flesh; W = white; Y = yellow; PR = partially red; RT -= russet. Significance: Means not sharing the same letter are significantly different at the P < .05 level.