

## **Volunteer Potato Management and Outlook for 2006**

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Volunteer potatoes are a significant weed problem most years in the Columbia Basin potato growing region. Managing volunteer potatoes in crop rotations requires an integration of numerous techniques and practices in order to prevent yield and quality losses and to prevent new tuber production that perpetuates the problem in the rotation. A new WSU extension bulletin (EB1993) is available for purchase that covers the biology and management options for volunteer potatoes. The bulletin can be downloaded for free at <http://cru.cahe.wsu.edu/CEPublications/eb1993/eb1993.pdf>.

Many potato tubers left in the soil after harvest may have been killed by cold soil temperatures throughout the Columbia Basin this winter. Potatoes normally are killed when they reach temperatures  $\leq 28^{\circ}$  F. Data from numerous AGWeatherNet weather stations with buried thermocouples indicated that soil temperatures reached a minimum on Dec. 19, 2005 throughout the region. Minimum soil temperatures at the 8 inch depth recorded at AGWeatherNet stations near Quincy and Royal City, WA reached 27.8 F and 26 F, respectively (Fig. 1). However, minimum soil temperatures in December recorded at 4 and 8 in. at Prosser, Hermiston, and Odessa did not drop below 29 F (Fig. 1 and 2). In addition, minimum soil temperatures in December recorded 8 in. deep near Othello and Paterson (100 Circles) did not drop below 31 F and 29 F, respectively (Fig. 1). Minimum soil temperatures at the ARS Paterson research farm in December were 26.6 F at 4 in. deep and 29.1 F at 7 in. deep, which has the potential to eliminate the majority of the tubers left in the soil. Differences in soil temperatures throughout the region are likely due to differences in air temperatures, snow cover, soil moisture, aspect, and amount of crop residues.

Due to variation in soil temperatures from site to site, examination of potato fields should be done to accurately determine the extent of winter kill. Tubers killed by cold temperatures are soft and often leak fluids under pressure, although internally appear relatively normal after cut open. Viable tubers that have escaped cold injury are firm. Tubers that are firm on the underside and soft and leaking on the upper side can often be found which mark the depth that killing temperatures reached.

We estimate more tuber mortality than occurred in 2005, but certain areas of the Columbia Basin will still be faced with significant volunteer potato problems in 2006.

### **Recommendations for Volunteer Potato Control:**

Growers should minimize the number of tubers left in the field during potato harvest (see EB1993). Newberry and Thornton (2004) demonstrated that deep fall tillage (mold board plow) that buries tubers deeper prior to cold winter temperatures should be avoided. Previous studies comparing tillage practices indicated that plowing following a deep penetrating frost could be beneficial by

exposing deeper buried tubers to additional freezing events (Thomas and Smith, 1983). However, weather patterns are not always conducive to make this practice effective and field access in winter months is often limited.

Control measures should strive to minimize competition with rotational crops and formation of new daughter tubers that can persist and cause problems in subsequent crops. Several components of volunteer potato management that growers can implement in this year's rotational crops are listed below.

- On higher value crops with nematode problems such as carrot or onions, spring fumigate with metham sodium (Vapam, Busan, and others) and 1, 3,-dichloropropene (Telone II). Field studies indicate about 70 to 75% of tubers are killed by a combination of Telone II at 10 GPA applied with shanks plus Vapam at 30 GPA applied by center pivot. Lower rates of fumigants are less effective in killing tubers. Follow labels for proper rates, soil temperatures, soil moisture, and time required between fumigation and planting of subsequent crop.
- If possible, delay planting of the rotation crop to allow maximum early volunteer potato emergence and apply glyphosate (Roundup) or remove with tillage.
- Use herbicides that are active in reducing volunteer potatoes in rotation crops. Several herbicides can be very effective in killing potato plants and reducing daughter tuber weight, including mesotrione (Callisto), fluroxypyr (Starane), atrazine (Aatrex, Atrazine), glyphosate (Roundup), dicamba + diflufenzopyr (Distinct), dicamba (Banvel, Clarity), and imazamox (Raptor). Repeated applications of contact herbicides such as, oxyfluorfen (Goal), carfentrazone (Aim), fomesafen (Reflex), pyridate (Tough), glufosinate (Rely), and paraquat (Gramoxone) can also be effective. Follow labels closely for labeled crops, proper rates, timing of applications, and crop rotation restrictions.
- When possible, apply postemergence herbicides when potatoes are just beginning to initiate tubers on stolons. If applications are made earlier, mother tubers often resprout and the volunteer plants will require additional herbicide applications. If applications are made later, yield loss may have already occurred and many new tubers will have already formed which will infest next year's crop.
- Previous USDA-ARS research demonstrated that cultivation about 1 week after postemergence applications of Starane, Goal, Roundup, and Banvel greatly reduced the number of daughter tubers formed compared to herbicides alone. In corn, Callisto herbicide has reduced new daughter tuber formation greater than other postemergence herbicides. Cultivation after Callisto application may not improve volunteer potato control.
- Select competitive crops and those with effective herbicide and cultivation options like field corn. Crops like carrots have no effective herbicides registered for volunteer potato control, so avoid planting such crops in fields where volunteers will be plentiful. Winter wheat is a very competitive crop and delays volunteer potato emergence in the spring. However, cultivation

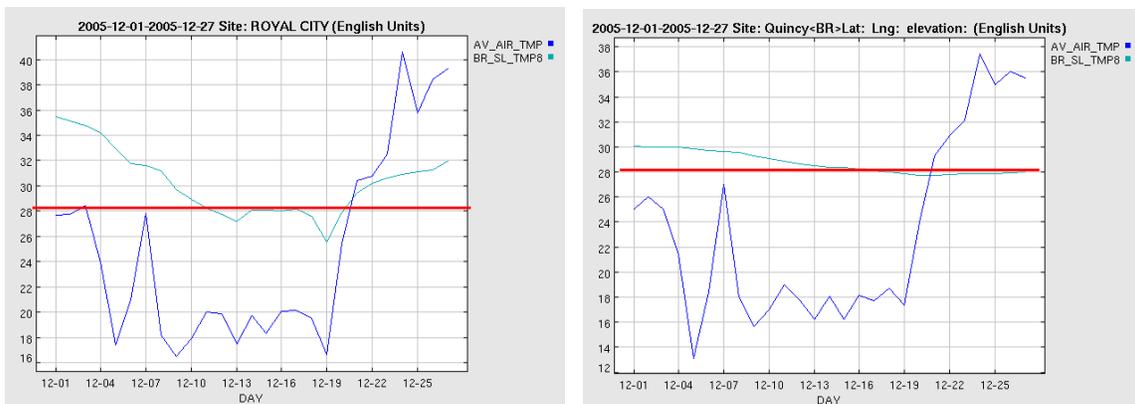
isn't practical in wheat and there are limited opportunities for timing effective herbicide applications in winter wheat prior to new tuber set on volunteer potatoes.

- Repeated cultivations and hand weeding can control volunteer potatoes, but they are most effective and economical when combined with other control methods.
- Grazing fields with hogs, sheep, or cattle may also reduce the number of tubers available to sprout.

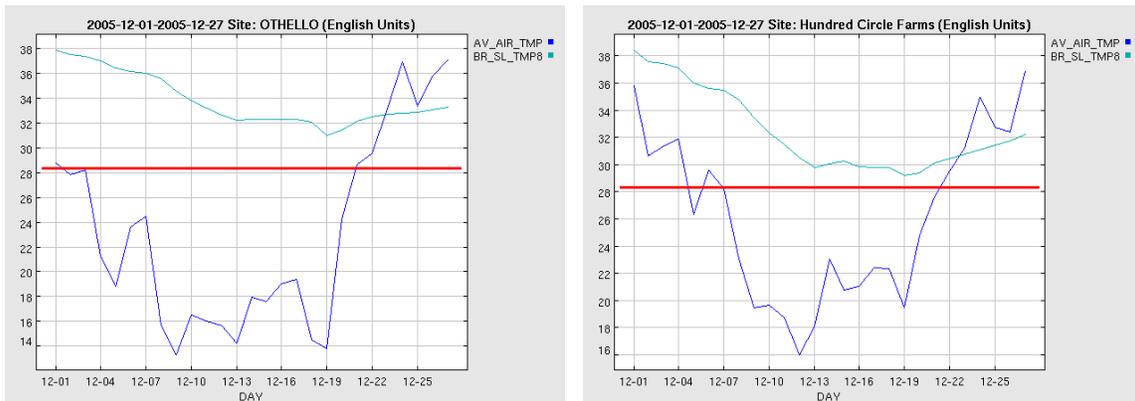
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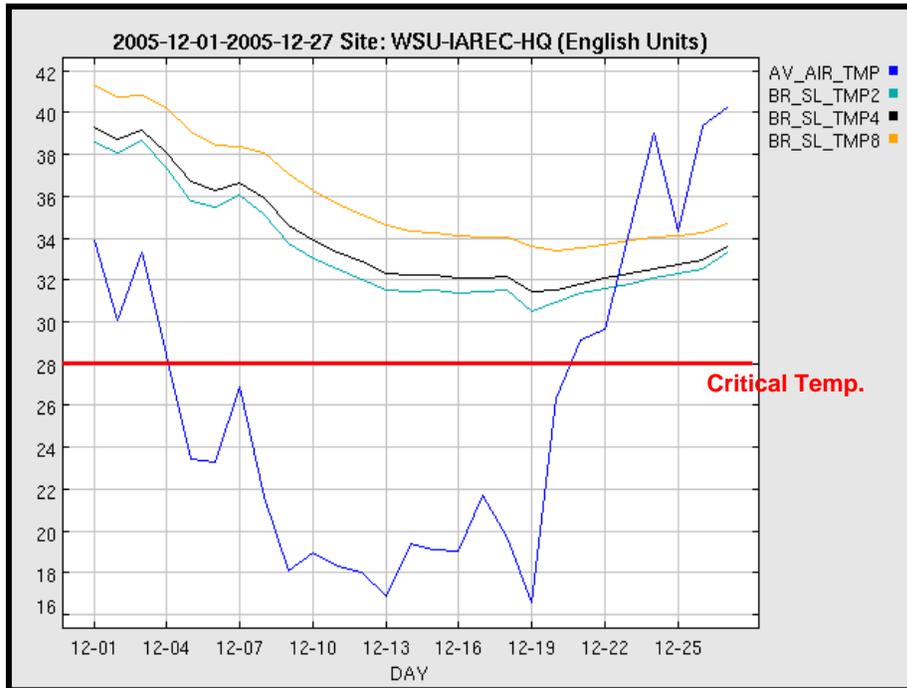
**Figure 1.** Minimum soil temperatures recorded 8 in. deep at four AGWeatherNet stations during December 2005 and minimum soil temperatures recorded Dec. 19, 2005 at 4 in. and 8 in. from two Agrimet weather stations at Odessa, WA and Hermiston, OR. Red line indicates critical temperature required to kill potato tubers.



Dec. 19 Hermiston, OR Soil Temp. 4" = 33.1 and 8"=34.3 Odessa, WA Soil Temp. 4" = 29.8 and 8" = 32.5



**Figure 2.** Minimum soil temperatures recorded at 2, 4, and 8 in. deep at AGWeatherNet station near Prosser, WA in December 2005.



Literature cited.

Newberry, GD and RE Thornton. 2004. Influence of post harvest tillage and rotation crop selection on volunteer potato survival. Abstract in Amer Potato J 81:77.

Thomas, PE and DR Smith. 1983. Relationship between cultural practices and the occurrence of volunteer potatoes in the Columbia Basin in northwest United States. Amer Potato J 60:289-294.