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Metopolophium festucae cerealium (Hemiptera: Aphididae), a new addition to the aphid fauna of North America

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Metopolophium festucae cerealium (Hemiptera: Aphididae), a new addition to the aphid fauna of North America

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Abstract. *Metopolophium festucae cerealium* (Stroyan) (Hemiptera: Aphididae) was found in wheat fields in the Pacific Northwest in 2011 and 2012. This is the first record of *M. f. cerealium* in North America. This subspecies can be a serious pest of cereal crops.

Key Words. *Metopolophium festucae cerealium*, cereal crops, wheat, cereal aphids

Introduction

Stroyan (1982) separated the subspecies *Metopolophium festucae cerealium* Stroyan (Hemiptera: Aphididae) from *Metopolophium festucae* (Theobald, 1917), *sensu stricto*, based on morphological characters and host preferences. *Metopolophium festucae s.s.* feeds on a variety of grasses, but is only incidental on cereal crops, whereas *M. f. cerealium* is a significant pest of cereal crops. It also can be found on grasses.

Plumb (1974) reported that *M. festucae* (presumably *M. festucae cerealium*) is more damaging to oats (*Avena sativa* L.) than to other cereals, causing damage similar to that reported for *Schizaphis graminum* (Rondani) in the USA. Dent and Wratten (1986) assessed host plant relationships of *M. festucae cerealium* among various pasture grasses and wheat (*Triticum aestivum* L.). They found that wheat was more susceptible than any of the grasses tested.

Metopolophium festucae was reported in the USA in California in 1970 (Foottit et al. 2006). It is not listed in the Idaho fauna (Gittins et al. 1976), but it is listed (subspecies unspecified) as occurring in the Pacific Northwest in Pike et al. (2003). In Idaho, *M. festucae* briefly became a pest in 1994 in Boise on fescue lawns. People who were encouraged to plant drought-tolerant fescue lawns inadvertently planted a monoculture of the favored host plant for this species. Moreover, the mild winter of 1993/1994 enabled this commonly anholocyclic species to overwinter easily in the Boise area. Populations in a few lawns reached hundreds per leaf; however, no colonization of cereal crops was observed. Measurements of the specimens were borderline between the two subspecies, but the dorsal pattern on the alatae appeared to match that of *M. festucae s.s.* (Fig. 2). Vouchers are deposited in the Florida State Collection of Arthropods (FSCA).

From the mid 1980s through the mid 1990s, cereal crops in the Pacific Northwest were surveyed extensively for aphids because of epidemics of barley yellow dwarf and because of the establishment of the Russian wheat aphid, *Diuraphis noxia* (Mordvilko) in the late 1980s. A few specimens that appeared to be *M. f. cerealium* were collected in suction traps in 1994 in Oregon at Corvallis, Madras, and Hermiston. No colonization of cereal crops was observed. The apparent specimens of *M. festucae cerealium* were reported informally (Halbert and Sandvol 1995), but follow-up with surveys on cereal crops was recommended to confirm the identity of the collections. Until now, this aphid has not been reported on cereal crops in the USA.

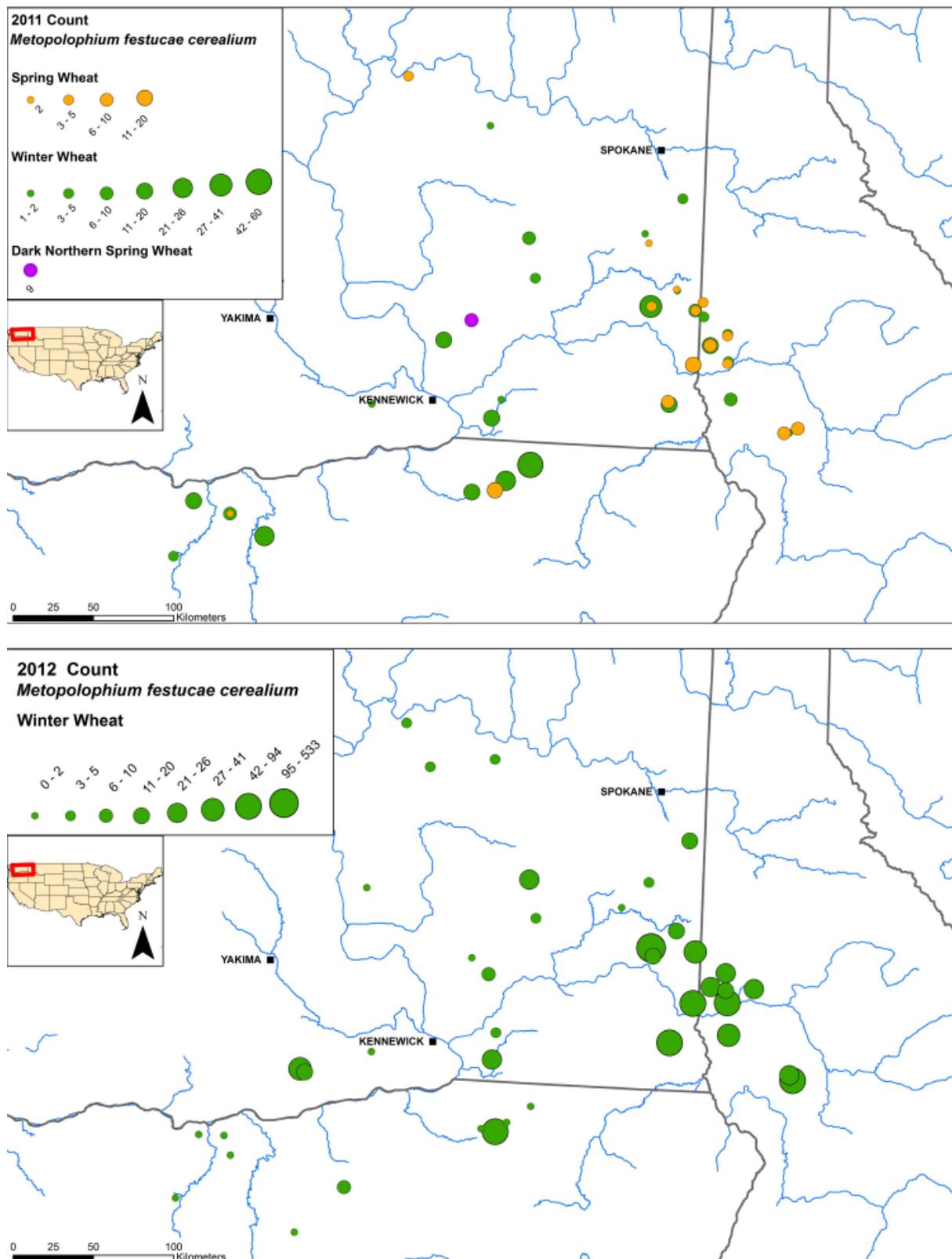
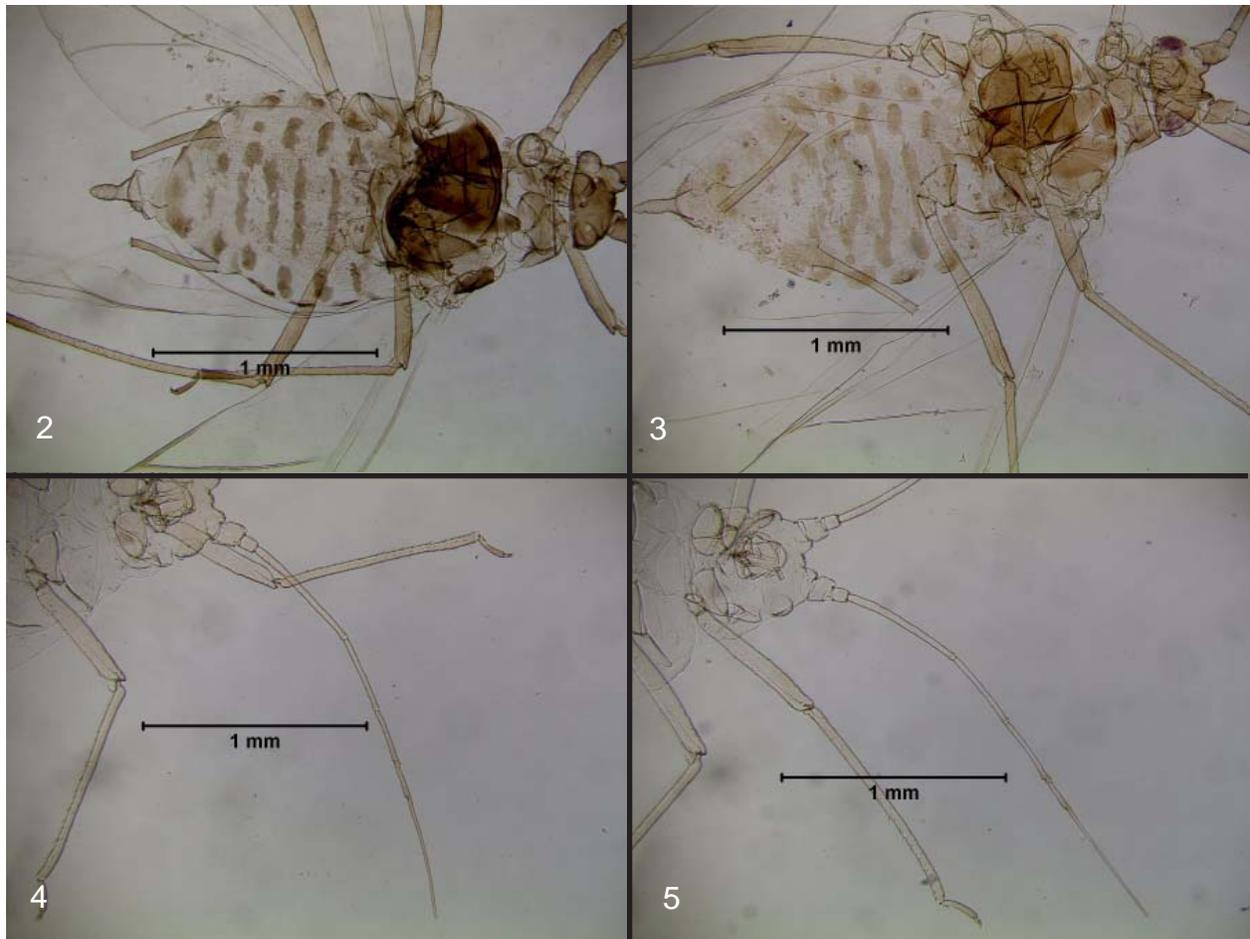


Figure 1. Maps showing locations and relative numbers of *Metopolophium festucae cerealium* Stroyan in samples collected in 2011 and 2012 in the Pacific Northwest. Map by Alicia Lawrence, FDACS/DPI.



Figures 2-5. **2)** Dorsum of *Metopolophium* sp., probably *festucae sensu stricto*. This aphid was collected from a fescue lawn in Boise Idaho. Note the lack of a rudimentary patch on abdominal segments V and VI (just anterior to siphunculi), and the curved, slightly darker siphunculi, as compared with *Metopolophium festucae cerealium*, Fig. 3. **3)** Dorsum of alate *Metopolophium festucae cerealium*. Note abdominal pattern, especially incomplete patch on segments V and VI (just anterior to the siphunculi). **4)** *Metopolophium festucae cerealium* antenna of apterous form. Note that joints are not darkened. **5)** *Metopolophium dirhodum* antenna of apterous form. Note dark joints on the antenna, especially on segments V and VI.

Recent surveys and discussion of species

In June and July of 2011, another cereal aphid survey project was initiated that included sweep sampling of wheat fields in Washington, Oregon, and Idaho. Nearly every sample contained *M. festucae cerealium*. The aphids were found in both winter and spring wheat, and in all three states (Table 1). Voucher specimens from fifteen locations are deposited at the FSCA.

More samples were collected in 2012 (Table 2). Large numbers of *M. f. cerealium* were collected at some locations. (Fig. 1)

Only two species of *Metopolophium* occur on cereals in the Pacific Northwest. *Metopolophium dirhodum* (Walker) (rose grass aphid), another adventive species, has been in the USA at least since 1910 (Footitt et al. 2006). It is common and numerous in cereal crops, especially late season wheat (personal observations, S.E. Halbert). Separation of *M. festucae cerealium* from *M. dirhodum* is easier for alatae than for apterae. Alate *M. festucae cerealium* (Fig. 3) specimens have a pattern of broken bars on their abdomens, whereas alate *M. dirhodum* specimens do not have abdominal markings. Alate *M. festucae cerealium* on cereals might also be confused with alate *Sitobion avenae* (Fabricius), but specimens of *S. avenae* have

dark, reticulated siphunculi, whereas *Metopolophium* species have pale to dusky siphunculi without reticulation. Apterous *M. festucae cerealium* (Fig. 4) specimens have antennae that darken progressively from base to apex, whereas apterous *M. dirhodum* (Fig. 5) specimens have antennae with dark joints. Neither species has abdominal markings. Both species are easily separated from *S. avenae* apterae by their pale siphunculi and lack of abdominal markings.

Separation of *M. festucae s.s.* from *M. f. cerealium* requires discriminant functions (Stroyan 1982). Sometimes results are borderline. According to Stroyan, however, *M. festucae s.s.* is not found on cereal crops. Also according to Stroyan (1982), *M. f. cerealium* alatae have intersegmental markings forming an incomplete patch on abdominal segments V and VI (Fig. 3), whereas *M. festucae s.s.* alatae never have this feature (Fig. 1).

It is not known at this time whether *M. festucae cerealium* will prove to be a significant pest of cereal crops in North America. *Metopolophium festucae* is a recorded vector of one or more the barley yellow dwarf complex of cereal viruses (Jedlinski 1981; Plumb 1974). Blackman et al. (1990) suggested that these records should refer to *M. festucae cerealium*.

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Literature Cited

- Blackman, R.L., V. F. Eastop, and P.A. Brown. 1990.** The biology and taxonomy of the aphids transmitting barley yellow dwarf virus. p 197-214. *In*: P.A. Burnett (ed.) World Perspectives on Barley Yellow Dwarf. CIMMYT; Mexico, D.F., Mexico. 511 p.
- Dent, D. R., and S. D. Wratten. 1986.** The host-plant relationships of apterous virginoparae of the grass aphid *Metopolophium festucae cerealium*. *Annals of Applied Biology* 108: 567-576.
- Footitt, R. G., S. E. Halbert, G. L. Miller, E. Maw, and L. M. Russell. 2006.** Adventive aphids (Hemiptera: Aphididae) of America north of Mexico. *Proceedings of the Entomological Society of Washington* 108: 583-610.
- Gittins, A. R., G. W. Bishop, G. F. Knowlton, and E. J. Parker. 1976.** An annotated list of the aphids of Idaho (Homoptera: Aphidae [sic]). *Research Bulletin No. 95*, University of Idaho Agricultural Experiment Station, College of Agriculture; Moscow, ID. 47 p.
- Halbert, S. E., and L. E. Sandvol. 1995.** New or unusual pests in Idaho in 1994. *Research Reports: 54th Annual Northwest Insect Management Conference*, Imperial Hotel, Portland Oregon, January 1995. p. 71.
- Jedlinski, H. 1981.** Rice root aphid, *Rhopalosiphum rufiabdominalis*, a vector of barley yellow dwarf virus in Illinois, and the disease complex. *Plant Disease* 65: 975-978.
- Pike, K. S., L. L. Boydston, and D. W. Allison. 2003.** Aphids of western North America north of Mexico with keys to subfamilies and genera for female alatae. *Washington State University*; Pullman, WA. 282 p. (See especially pages 176-177.)
- Plumb, R. T. 1974.** Properties and isolates of barley yellow dwarf virus. *Annals of Applied Biology* 77: 87-91.
- Stroyan, H. L. G. 1982.** Revisionary notes on the genus *Metopolophium* Mordvilko, 1914, with keys to European species and descriptions of two new taxa (Homoptera: Aphidoidea). *Zoological Journal of the Linnean Society* 75: 91-140.

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Table 1. Sweep samples of *Metopolophium festucae cerealium* collected in wheat in 2011 in the Pacific Northwest. Asterisks (*) indicate that at least one voucher sample was collected from that location. Vouchers are deposited in the Florida State Collection of Arthropods (FSCA).

State	County	Municipality	Crop	Sample Date	Alatae	Apterae	Altitude
Idaho	Idaho	Cottonwood	Spring wheat	11-Jul-11	7	3	3717 ft
Idaho	Idaho	Cottonwood	Winter wheat	11-Jul-11	1	0	2225 ft
Idaho	Idaho	Greencreek	Spring wheat	11-Jul-11	6	2	3130 ft
Idaho	Idaho	Greencreek	Winter wheat	11-Jul-11	1	1	3129 ft
*Idaho	Latah	Genesee	Spring wheat	7-Jul-11	4	1	2600 ft
Idaho	Latah	Genesee	Spring wheat	15-Jul-11	4	4	2762 ft
Idaho	Latah	Genesee	Spring wheat	7-Jul-11	1	4	2218 ft
Idaho	Latah	Genesee	Winter wheat	7-Jul-11	2	2	2658 ft
Idaho	Latah	Genesee	Winter wheat	15-Jul-11	12	5	2762 ft
Idaho	Latah	Genesee	Winter wheat	7-Jul-11	2	1	2441 ft
Idaho	Latah	Moscow	Spring wheat	1-Jul-11	3	1	2677 ft
*Idaho	Latah	Moscow	Winter wheat	1-Jul-11	3	1	2682 ft
Idaho	Nez Perce	Culdesac	Winter wheat	11-Jul-11	1	9	2960 ft
Oregon	Gilliam	Condon	Winter wheat	10-Jun-11	5	18	3463 ft
*Oregon	Sherman	Moro	Spring wheat	10-Jun-11	2	0	1882 ft
Oregon	Sherman	Moro	Winter wheat	10-Jun-11	3	4	1882 ft
Oregon	Umatilla	Adams	Winter wheat	22-Jun-11	2	22	1574 ft
Oregon	Umatilla	Milton-Freewater	Winter wheat	21-Jun-11	14	46	1683 ft
Oregon	Umatilla	Pendleton	Spring wheat	10-Jun-11	16	3	3470 ft
Oregon	Umatilla	Pendleton	Winter wheat	22-Jun-11	2	13	1454 ft
*Oregon	Umatilla	Pendleton	Winter wheat	10 Jun-11	2	3	3470 ft
*Oregon	Wasco	Maupin	Winter wheat	9-Jun-11	1	2	1660 ft
*Oregon	Wasco	The Dalles	Winter wheat	9-Jun-11	5	13	1063 ft
*Washington	Adams	Lind	Winter wheat	17-Jun-11	4	4	1872 ft
Washington	Adams	Ritzville	Winter wheat	17-Jun-11	2	2	1737 ft
Washington	Asotin	Asotin	Spring wheat	5-Jul-11	3	5	2900 ft
Washington	Asotin	Asotin	Winter wheat	5-Jul-11	6	7	3017 ft
Washington	Benton	Prosser	Winter wheat	22-Jun-11	0	2	1207 ft
Washington	Douglas	Bridgeport	Spring wheat	16-Jun-11	0	3	2058 ft
Washington	Franklin	Connell	Dark Northern	17-Jun-11	7	2	2342 ft
			Spring wheat				
Washington	Franklin	Connell	Winter wheat	17-Jun-11	1	16	2340 ft
*Washington	Lincoln	Wilbur	Winter wheat	15-Jun-11	2	0	2136 ft
*Washington	Spokane	Fairfield	Winter wheat	30-Jun-11	4	1	2558 ft
*Washington	Walla Walla	Prescott	Winter wheat	22-Jun-11	0	2	976 ft
*Washington	Walla Walla	Touchet	Winter wheat	21-Jun-11	4	10	973 ft
Washington	Whitman	Almota	Spring wheat	5-Jul-11	3	2	2369 ft
Washington	Whitman	Almota	Winter wheat	5-Jul-11	5	25	2353 ft
Washington	Whitman	Colfax	Spring wheat	30-Jun-11	0	2	2337 ft
Washington	Whitman	Colfax	Winter wheat	30-Jun-11	1	0	2379 ft
*Washington	Whitman	Pullman	Spring wheat	14-Jul-11	1	3	2621 ft
Washington	Whitman	Pullman	Winter wheat	14-Jul-11	1	8	2629 ft
Washington	Whitman	Rosalia	Spring wheat	30-Jun-11	0	2	2316 ft
Washington	Whitman	Rosalia	Winter wheat	17-Jun-11	0	1	2102 ft
*Washington	Whitman	Uniontown	Spring wheat	5-Jul-11	14	2	2806 ft
Washington	Whitman	Uniontown	Winter wheat	5-Jul-11	10	0	3012 ft

Table 2. Sweep samples of *Metopolophium festucae cerealium* collected in wheat in 2012 in the Pacific Northwest.

State	County	Municipality	Crop	Sampling Date	Alatae	Apterae	Altitude
Idaho	Idaho	Cottonwood	Winter wheat	19-Jun-12	12	11	3393 ft
Idaho	Idaho	Greencreek	Winter wheat	19-Jun-12	25	41	3295 ft
Idaho	Latah	Genesee	Winter wheat	4-Jun-12	6	11	2760 ft
Idaho	Latah	Genesee	Winter wheat	4-Jun-12	32	29	2484 ft
Idaho	Latah	Genesee	Winter wheat	25-Jun-12	13	8	2655 ft
Idaho	Latah	Genesee	Winter wheat	27-Jun-12	9	14	2762 ft
Idaho	Latah	Kendrick	Winter wheat	25-Jun-12	10	15	2371 ft
Idaho	Latah	Moscow	Winter wheat	6-Jun-12	1	1	1737 ft
Idaho	Nez Perce	Culdesac	Winter wheat	19-Jun-12	11	26	2386 ft
Oregon	Gilliam	Condon	Winter wheat	21-May-12	0	1	3143 ft
Oregon	Morrow	Heppner	Winter wheat	15-Jun-12	1	6	2173 ft
Oregon	Sherman	Moro	Winter wheat	22-May-12	0	1	1871 ft
Oregon	Sherman	Wasco	Winter wheat	23-May-12	1	1	1235 ft
Oregon	Umatilla	Adams	Winter wheat	11-May-12	0	2	1596 ft
Oregon	Umatilla	Milton-Freewater	Winter wheat	10-May-12	2	0	1683 ft
Oregon	Umatilla	Pendleton	Winter wheat	11-May-12	0	1	1562 ft
Oregon	Umatilla	Pendleton	Winter wheat	11-May-12	10	43	3470 ft
Oregon	Wasco	Maupin	Winter wheat	21-May-12	0	1	1652 ft
Oregon	Wasco	The Dalles	Winter wheat	21-May-12	0	1	898 ft
Washington	Adams	Lind	Winter wheat	30-May-12	17	8	1890 ft
Washington	Adams	Ritzville	Winter wheat	30-May-12	2	2	1724 ft
Washington	Asotin	Asotin	Winter wheat	31-May-12	45	49	2806 ft
Washington	Benton	Prosser	Winter wheat	23-May-12	1	0	934 ft
Washington	Douglas	Bridgeport	Winter wheat	5-Jun-12	0	4	2266 ft
Washington	Franklin	Connell	Winter wheat	16-May-12	0	8	1190 ft
Washington	Franklin	Connell	Winter wheat	16-May-12	0	1	1131 ft
Washington	Grant	Coulee City	Winter wheat	5-Jun-12	1	2	2324 ft
Washington	Grant	Quincy	Winter wheat	16-May-12	0	0	1200 ft
Washington	Klickitat	Bickleton	Winter wheat	14-Jun-12	8	23	2793 ft
Washington	Klickitat	Bickleton	Winter wheat	14-Jun-12	3	14	2576 ft
Washington	Lincoln	Wilbur	Winter wheat	5-Jun-12	1	2	2315 ft
Washington	Spokane	Fairfield	Winter wheat	25-Jun-12	10	7	2604 ft
Washington	Walla Walla	Prescott	Winter wheat	10-May-12	1	2	1044 ft
Washington	Walla Walla	Touchet	Winter wheat	10-May-12	4	22	973 ft
Washington	Whitman	Colfax	Winter wheat	11-Jun-12	17	3	2360 ft
Washington	Whitman	Almota	Winter wheat	22-Jun-12	116	417	2348 ft
Washington	Whitman	Palouse	Winter wheat	7-Jun-12	9	9	2199 ft
Washington	Whitman	Pullman	Winter wheat	22-Jun-12	15	26	2738 ft
Washington	Whitman	Rosalia	Winter wheat	7-Jun-12	0	3	2185 ft
Washington	Whitman	Uniontown	Winter wheat	13-Jun-12	21	41	2799 ft