CROP and SOIL NEWS/NOTES

September, 2008
Vol. 22, No. 5

DATES AND PLACES

October 2 – Dept. of Agricultural and Resource Economics Conference, "Rising Food and Energy Prices: US Food Policy at a Crossroads," Corvallis.

October 21-22 – Oregon Society of Weed Science Annual Meeting, Hood River, OR. Program information can be found at http://cropandsoil.oregonstate.edu/osws/ For further information, please contact Rich Affeldt (541-475-7107; email: Rich.Affeldt@oregonstate.edu).

December 8-9 – Oregon Seed Growers League Annual Meeting, Salem Convention Center, Salem, OR. Details will follow in November newsletter.

December 10-12 – Oregon/Idaho Grain Conference, Coeur d'Alene Resort, Coeur d'Alene, ID. Details can be found at www.idahograin.org.

July 8, 2009 – Malheur Experiment Station Annual Field Day, Ontario. 8:30 AM – 1 PM. A complimentary lunch will be served. Please make reservation for lunch for contacting Janet Jones (phone: 541-889-2174; email: janet.jones@oregonstate.edu.

August 25, 2009 – Malheur Experiment Station Onion Variety Day, Ontario. A complimentary lunch will be served. Please make reservation for lunch for contacting Janet Jones (phone: 541-889-2174; email: janet.jones@oregonstate.edu.

SEED PRODUCTION

Bill Young

Oregon Seed Growers League 2008 annual meeting

The 68th annual meeting of the OSGL will be held at the Salem Convention Center, Salem, OR on December 8-9, 2008. Those who attended last year's meeting (in Salem) will be pleased with the board of director's decision to return to this excellent conference facility again this year. If, however, it has been more than a year since attending an OSGL convention, please note the change in their long-standing tradition of meeting in Portland. Mark you calendars now, as numerous topics of interest to Oregon seed growers and seed industry representatives are being planned. More details on this year's program will be printed in our next newsletter.

A personal note of "*Thanks*"

As many are aware, I was challenged this summer by a major surgery: quadruple bypass. Open-heart surgery is not for "sissies," and it takes a while to recover from such an operation. I've just passed the three-month anniversary of my "fix," and have already finished 2/3s of the sessions I'm obliged to complete in the cardiac rehabilitation program. In spite of all this, I consider myself to be a lucky man! I did not suffer a heart attack (i.e., no permanent muscle damage to the heart), and a full recovery is anticipated. At this point in time I think "I'm running on about seven cylinders" (assuming I'm "powered" by a V-8 engine).

I won't deny that there were some "dark days" in the early weeks following my operation. However, I was truly blessed with a great number of cards, phone calls and e-mails from more people than I would ever have guessed cared so much to make such an effort. One can't imagine the benefit that such gestures of caring provide to the healing process. Thank you all very much!

WEED CONTROL

Andy Hulting

All Things Clearfield Wheat

At several wheat grower and Extension meetings this fall the interrelated themes of Clearfield wheat variety selection, imazamox (Beyond or Clearmax) herbicide performance, jointed goatgrass (JGG) and Clearfield wheat hybridization, herbicide resistance management and imazamox carryover have all been popular discussion topics. It is unclear as to exactly why these issues have come to the forefront during this growing season because the Clearfield wheat system has been in use for several years now. However, reports of inconsistent control of grass weeds with imazamox coupled with reports of increased presence of JGG *X* wheat hybrids and various imazamox carryover scenarios across the state this year are likely leading to the increased discussion. Below I revisit and give updates on some of these topics.

Environmental conditions can affect imazamox performance

There were several reports of inconsistent JGG, feral rye and downy brome control with imazamox in Clearfield wheat this season. The poor control is likely due to timing of application or environmental conditions at the time of or soon after application rather than resistance to imazamox. However, if true resistance is suspected growers or fieldmen can contact our group concerning testing of specific weed populations. We know that control of several grass weeds decreases with temperature after application and under dry or extremely wet conditions. In fact, language on the Beyond and Clearmax product labels spells out the environmental conditions that may lead to inconsistent weed control and/or wheat injury. It is important not to apply imazamox when cold, wet weather is expected within one week following application. Reduced weed control efficacy and crop injury may occur when maximum daytime temperatures are less than 40° F after application. If possible, growers need to time fall and spring applications of imazamox to avoid these types of conditions and maximize weed control efficacy with imazamox.

Latest findings on the JGG and wheat hybridization issue

The OSU Weed Science Group continues to monitor the JGG and Clearfield wheat hybridization scenarios. JGG *X* wheat hybrids tend to be very robust plants that may be better competitors than either wheat or JGG for water, light and nutrients and could be a serious weed management issue when found at high

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Adriel Garay, Seed Laboratory	737-4464	Barb Reed, Secretary, Crops Unit	737-5854
David Hannaway, Forages	737-5863	Silvia Rondon, Irrigated Crops, Entomology	567-6337
John Hart, Soil Fertility	737-5714	Dan Sullivan, Soil/Water Quality	737-5715
Andy Hulting, Weed Management	737-5098	Don Wysocki, Cereals/Soils, CBARC	278-4186
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densities. This year tissue and seed samples were collected from JGG and JGG *X* wheat hybrids in a field located in Sherman County prior to harvest this fall. Based on the tissue test, 100% of the hybrids tested from this population carried the gene from Clearfield wheat conferring resistance to imazamox. Seed from the plants was planted in the greenhouse in Corvallis and seedlings were sprayed with labeled use rates of imazamox. None of the JGG seedlings tested were resistant to the imazamox treatments in the greenhouse, but all of the seedlings resulting from the hybrid plants were resistant. We know that hybridization continues to occur in the field and that a percentage of these hybrids are resistant to imazamox, as was the case in this particular field. These hybrids are male sterile plants and require pollen from either wheat or JGG to reproduce but can backcross to both species. The potential exists for the gene conferring resistance to imazamox to eventually be expressed in JGG populations resulting in the loss of the Clearfield technology if these new resistant JGG populations became wide spread. Those growers electing to plant the Clearfield wheat varieties based solely on yield potential and electing not to treat with imazamox will increase chances of hybridization between wheat and JGG if JGG populations exist in or near the field. This may result in the buildup of a resistant population over time that is not only resistant to imazamox, but also has the potential to be a very competitive weed. Doing a good job controlling JGG and hybrids in fallow in wheat-fallow systems will slow the development of the hybrid populations.

Crop rotation restriction label changes anticipated?

There has been recent speculation regarding changes to the crop rotation intervals on the Beyond and Clearmax labels based on some recent imazamox carryover cases.

Herbicide label changes are common and plant back restrictions are continuously adjusted to reflect cropping system management effects, such as tillage and irrigation practices, on herbicide carryover potential for specific production regions. I urge growers to always be on the lookout for updated labels for these two specific products and many others. For some oilseed crops newer to the region, such as safflower or camelina, not currently listed on the labels and for which the plant back intervals have yet to be determined the plant back interval is likely greater than 18 months and may be a long as 26 months. The table below is a current, partial listing of rotational crop plant back intervals following Beyond and Clearmax applications.

Plant Back Interval (Months)	Crop(s)
0	CLEARFIELD* Wheat, CLEARFIELD* Sunflower, CLEARFIELD* Canola, Dry Beans, Dry Peas, Soybeans
3	Alfalfa, Wheat (non- CLEARFIELD*)
4	Cereal Rye
8.5	Corn (CLEARFIELD* and non- CLEARFIELD* pop, sweet, field, and seed)
9	Barley[1], Oat, Onion, Sunflowers, Peanut, Watermelon, Pumpkin
18	Barley[1], Carrot, Potato, Broccoli, Turnip, Cabbage
26	Canola, Condiment Mustards, Sugar Beet, Table Beet

[1] See Beyond or Clearmax labels for soil pH, tillage system and cumulative rainfall and/or irrigation requirements that most closely approximate your production system to determine the appropriate barley plant back interval.

Extension publications available…

Hard copies or online versions of publications related to Clearfield wheat and weed management with imazamox are available (or soon will be in the case of the ORCF 101 and 102 Clearfield Wheat Variety Guides) from OSU Extension and Experiment Station Communications: http://extension.oregonstate.edu/eesc/

- ORCF 101 CLEARFIED* Soft White Winter Wheat
- ORCF 102 CLEARFIED* Soft White Winter Wheat
- Weed Management in Clearfield Wheat with Imazamox. EM 8833
- Management Strategies for Preventing Herbicide-Resistant Grass Weeds in Clearfield Wheat Systems. PNW 572.
- Herbicide-Resistant Weeds and Their Management. PNW 437.

Invitation to View Hyslop Farm Research Plots

I want to once again extend an invitation to individual agricultural supply/consulting companies and grower groups to set up a time with me to tour the OSU Weed Group's 2008-09 grass seed, winter wheat, camelina, meadowfoam and other crop herbicide evaluation trials at Hyslop Farm. In the past, I have

scheduled tours throughout the end of November-January and generally set them up as informal question and answer sessions coupled with a tour of relevant plots that have lasted around 2-3 hours. Group size has ranged from 2-20, so any size group is welcome. Feel free to drop me a note or give me a call if this is of interest to you and your colleagues and we can get a personalized tour scheduled for later this year.

CEREALS

Mike Flowers

ORCF-101
CLEARFIELD* Soft White Winter Wheat

Michael Flowers, Extension Cereals Specialist, Oregon State University, C. James Peterson, Professor – Wheat Breeding and Genetics, Oregon State University, Andrew Hulting, Extension Weed Specialist, Oregon State University, John Burns, Extension Agronomist, retired, Cereal Variety Testing, Washington State University, John Kuehner, Scientific Assistant, Cereal Variety Testing, Washington State University

Variety Description:

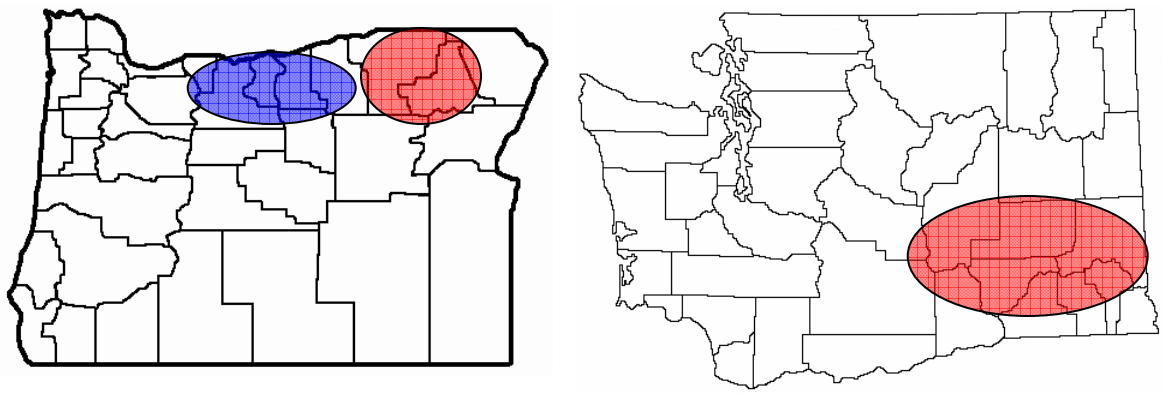
'ORCF-101' is a common soft white winter wheat developed by Oregon State University and the BASF Corporation in cooperation with USDA-ARS. It is an awned, short-statured, semidwarf variety with midseason maturity and high yield potential. ORCF-101 is a non-GM (genetically modified) wheat variety that carries an altered form of the acetolactate synthase (also known as acetohydroxyacid synthase) enzyme. The altered enzyme is not affected by imazamox, the active ingredient in Beyond™ herbicide and one of the active ingredients in Clearmax™ herbicide. When ORCF-101 is used in combination with Beyond™ or Clearmax™ at labeled rates, this CLEARFIELD* technology provides growers with an effective tool for control of several grassy weeds.

ORCF-101 is best adapted to the dryland wheat growing regions in Wasco, Sherman, Gilliam, and Morrow counties in Oregon (blue shaded regions). Secondary areas of adaptation (red shaded regions) for ORCF-101 are the general dryland wheat growing areas of eastern Oregon and southeastern Washington. In these secondary regions, performance of ORCF-101 is similar to other soft white winter wheat varieties. However, growers should consider a more disease resistant variety, such as ORCF-102, especially in high residue management situations. Moderate winterhardiness and susceptibility to snow mold restricts production of ORCF-101 in southeastern Washington to areas south of Highway 2.

Year Released:

ORCF-101 was released in 2003 and is protected under the Plant Variety Protection Act with the Title 5 option. ORCF-101 was released through Oregon State University's non-exclusive CLEARFIELD* variety licensing program. Foundation and Registered seed stocks may be sold only to those granted a license by OSU. Certified seed stocks may be used to plant a single commercial crop and may not be used to generate seed stocks for replanting. A signed BASF CLEARFIELD* wheat stewardship grower agreement is required prior to purchasing seed for planting.

Area of Adaptation:



Agronomic Characteristics:

Height and Lodging Resistance

In trials over 22 site-years in Oregon and 37 site-years in Washington, plant height of ORCF-101 has averaged 34.1 and 34.3 inches, respectively. This is similar to Madsen and approximately 2 inches shorter than Tubbs, Tubbs 06, and ORCF-102 (Tables 1 and 2). Straw strength of ORCF-101 is good and lodging has not been observed in any production environment.

Maturity

ORCF-101 is a mid-season maturing variety, similar to Tubbs, Tubbs 06, Madsen, and ORCF-102. It heads 2 days earlier than Madsen and approximately 1 to 2 days later than Stephens (Tables 1 and 2).

Vernalization and Cold Tolerance

ORCF-101 is a winter wheat that requires vernalization to initiate flowering. Results from crown freezing tests, a measure of cold tolerance, conducted by the USDA-ARS have shown that the cold tolerance of ORCF-101 is similar to Stephens. ORCF-101 is less cold tolerant than Tubbs, Tubbs 06, and slightly less than ORCF-102 (Table 3). However, under normal conditions growers in the Columbia Basin region of Oregon where ORCF-101 is best adapted are unlikely to observe winter injury during production of ORCF-101.

Disease Resistance

ORCF-101 is moderately susceptible to stripe and leaf rust, Septoria leaf blotch, and *Fusarium* crown rot (dryland foot rot). ORCF-101 is susceptible to *Cephalosporium* stripe, Strawbreaker (eyespot) foot rot, and snow mold. A fungicide seed treatment is recommended to control common bunt and other seed-borne diseases (Table 3).

Yield

ORCF-101 has been shown to have good yield potential across a range of environments in Oregon and Washington. Across 34 site-years of OSU variety testing, ORCF-101 averaged 85.8 bushels per acre compared to 90.4, 87.6, 90.7, 86.0, and 92.1 bushels per acre for Tubbs, Stephens, ORCF-102, Madsen, and Westbred 528, respectively (Table 1). Similarly, in 55 site-years of WSU variety testing ORCF-101 averaged 101.3 bushels per acre compared to 110.4, 101.1, 108.4, 102.1, and 104.5 bushels per acre for Tubbs, Stephens, ORCF-102, Madsen, and Masami, respectively (Table 2). In its primary adaptation region of Wasco, Sherman, Gilliam, and Morrow counties, ORCF-101 averaged 69.6 bushels per acre, similar to ORCF-102 and 3 bushels per acre higher than Tubbs (Table 1). In the low to intermediate rainfall environments south of highway 2 in Washington, ORCF-101 averaged 71.3 bushels per acre, similar to Eltan and Madsen but 6 to 8 bushels lower than ORCF-102, Tubbs, and Masami (Table 2).

Test Weight and Quality

Test weight of ORCF-101 averaged 59.2 pounds per bushel across 24 site-years in Oregon and 59.1 pounds per bushel across 37 site-years in Washington. These test weights are similar to Stephens and Madsen. Test weight of ORCF-101 was approximately 0.5 pounds per bushel more than Tubbs or Tubbs 06 and 1 pound per bushel less than ORCF-102 (Tables 1 and 2). Grain protein of ORCF-101 averaged 10.1% in Oregon and 11.7% in Washington, similar to Stephens and Madsen.

Milling and baking evaluations from the USDA-ARS Western Wheat Quality Laboratory and the PNW Wheat Quality Council suggest that ORCF-101 is similar to Tubbs and acceptable for a soft white winter wheat. Grain hardness values for ORCF-101 averaged 6 points higher than Stephens and 3 points less than Tubbs when measured with the Pertin Single Kernel Characterization System (SCKS). Average break flour yields were similar to Stephens and Tubbs. Cookie baking performance is similar to Stephens and average 0.16 centimeters wider cookie spread than Tubbs. Flour swelling volume tests suggest ORCF-101 has normal starch properties (Table 4).

Development

ORCF-101 was derived from the three way cross 'CV-9804'/'Malcom'//'OR939481' made in 1996 and 1997 at the OSU Hyslop Field Research Farm. CV-9804, also known as 'FS-4', is the donor of the Clearfield trait developed through mutagenesis of the cultivar 'Fidel'. 'OR939481' is a selection from the cross 'Stephens'/'Madsen'. ORCF-101 is an F_2 derived line, identified as a single plant in 1999 when it was selected from a bulk plot at the Columbia Basin Agricultural Research Center, Pendleton, OR. The selection was evaluated under the experimental number OR2010051.

Breeder and Foundation seed will be maintained by the Washington State Crop Improvement Association (WSCIA). ORCF-101 is protected under U.S. Plant Variety Protection with the Title 5 option (PVP 200300286). Certification classes recognized for ORCF-101 include Foundation, Registered and Certified. Certified seed will be produced and sold only under non-exclusive license with Oregon State University. Commercial growers may not retain seed for purposes of planting or re-planting. Seed stocks that fail to meet certification standards can not be sold as seed, nor used as seed. Seed of ORCF-101 has been deposited in the USDA National Small Grains Collection, Aberdeen, Idaho. It is requested that the source of this material be acknowledged in future use by wheat breeding and genetics programs.

Acknowledgements

Appreciation is extended to the Oregon Wheat Commission and BASF for financial support in the development of ORCF-101.

Variety Development Team

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Management Guidelines:

Planting Date

ORCF-101 has shown its highest yield potential in its primary adaptation zones with "on-time" plantings (Tables 1, 2, 5). Plantings in early to mid-October are considered "on-time" for much of Oregon.

Early planting of ORCF-101, prior to October 1 for most areas, is not recommended. Studies have documented the yields of ORCF-101 in early plantings are similar to varieties such as Tubbs and Stephens (Table 5). However, early seeding increases the incidence of diseases such as *Fusarium* crown rot, strawbreaker (eyespot) foot rot, and *Cephalosporium* stripe as well as insect vectored diseases such as Barley Yellow Dwarf Virus. The relative susceptibility of ORCF-101 to these diseases increases the risks of significant yield reductions due in plantings prior to October 1.

In late plantings, yields of all varieties will be reduced compared to "on-time" plantings. ORCF-101 is a relatively poor choice for late plantings. Studies have shown that yields of ORCF-101 will be significantly reduced by 6 to 13 bushels per acre compared to ORCF-102, and Tubbs 06 (Table 5).

Seeding Rate

The recommended seeding rate for soft white winter wheat in Oregon is 22 seeds per square foot. For late planted wheat it is recommended that the seeding rate be increased to 33 seeds per square foot. Seeding rate trials have confirmed that these general recommendations are valid for ORCF-101 (Table 6).

Seeding rates for most equipment are adjusted in pounds per acre. To avoid heavy or light plantings, it is important to determine the proper seeding rate using the number of seeds per pound. Conversions for a range of seeds per pound are found in Table 7.

The number of seeds per pound depends on seed size and varies based on variety, production environment, and year. Research has shown the ORCF-101 will have a higher number of seeds per pound compared to Stephens and Tubbs due to its lower kernel weight. The seeds per pound may be obtained from your seed dealer or determined by weighing a 50-seed sample and using Table 7.

Fertility

ORCF-101 has been grown across a wide range of environments and no special fertility requirements have been observed. Therefore, it is recommended that growers follow the recommended fertility guidelines for soft white winter wheat in their area.

Herbicide Applications

Postemergence applications of Beyond™ or Clearmax™ may be made in the fall/winter or spring to ORCF-101 after tiller initiation but before jointing. Apply Beyond™ (imazamox) at a rate of 4-6 oz/acre of product (0.031 to 0.047 lb ai/acre) or Clearmax™ (imazamox + MCPA ester co-pack) at a rate of 4-6 oz/acre Beyond™ + 8-12 oz/a (0.23 to 0.35 lb ae/a) MCPA ester. Beyond™ and Clearmax™ applications require the addition of a nonionic surfactant (0.25 % vol/vol) and a liquid nitrogen fertilizer (2.5 gallons/100 gallons of spray solution) or ammonium sulfate solution (12-15 lbs/100 gallons of spray solution) to the spray mixture. Do not use crop oil concentrate or methylated seed oil surfactants when making Beyond™ applications to ORCF-101 or injury will result. Beyond™ may be applied in a liquid fertilizer carrier as long as the liquid fertilizer/water solution is at least 50 % water. Do not tank mix Beyond™ and Clearmax™ with Group 2 sulfonylurea herbicides or unacceptable wheat injury may result. Review current Beyond™ and Clearmax™ labels for recommended tank mixture partners and mixing instructions.

Beyond™ and Clearmax™ will control or suppress many problem grass weed species in wheat production cropping systems including jointed goatgrass, downy brome, feral rye as well as many broadleaf weeds. Beyond™ or Clearmax™ should be applied to actively growing grass weeds in the 4-5 leaf stage and broadleaf weeds that are less than 3 inches tall. Refer to the weed control tables in the Beyond™ and Clearmax™ labels for more specific information on application timings, including fall timings, and recommended tank mixtures for specific problem weeds including feral rye, Italian ryegrass, wild oat and kochia. Do not apply Beyond™ or Clearmax™ when cold, wet weather is expected within one week following application. Reduced weed control efficacy and crop injury may occur when maximum daytime temperatures are less than 40° F after application.

Further information on optimizing weed control utilizing CLEARFIELD technology may be found in:

PNW Weed Management Handbook.

Weed Management in Clearfield Wheat with Imazamox. EM 8833.

Available online at:http://extension.oregonstate.edu.

Table 9 lists the plant back restrictions for some common rotation crops that could follow ORCF-101 wheat in OR. Review the most current Beyond™ or Clearmax™ labels for the full list of crop rotational intervals before electing to plant and making applications of Beyond™ or Clearmax™ to ORCF-101 to insure that future crop rotation goals can be achieved. Herbicide label changes are common and plant back restrictions are continuously adjusted to reflect cropping system management effects, such as tillage and irrigation practices, on herbicide carryover potential for specific production regions. For some oilseed crops newer to the region , such as safflower or camelina, not currently listed on the labels and for which the plant back intervals have yet to be determined the plant back interval is likely greater than 18 months and may be a long as 26 months.

Herbicide resistance management is a key consideration when utilizing CLEARFIELD* technology. Maintaining the utility of ALS-inhibiting Group 2 herbicides in wheat production cropping systems is crucial for increasing the longevity of this production technology. Thus, Oregon State University strongly advocates that growers follow the BASF stewardship recommendations outlined in the CLEARFIELD* Wheat Stewardship Guide. These recommendations include:

1) Do not plant ORCF-101 or any other CLEARFIELD* wheat variety continually and apply Beyond™ or Clearmax™ more than 2 out of every 4 years.
2) Limit the reliance on ALS-inhibiting herbicides and when applicable use herbicides with different modes-of-action.
3) Properly manage weeds in wheat-fallow-wheat rotations.
4) Treat the entire field with a labeled rate of Beyond™ or Clearmax™ for jointed goatgrass control.
5) Control jointed goatgrass in fencerows, road ditches, and pastures around CLEARFIELD* wheat fields.

In addition, the following two publications outline some strategies for slowing or preventing the development of herbicide resistant weed populations:

Management Strategies for Preventing Herbicide-Resistant Grass Weeds in Clearfield Wheat Systems. PNW 572. Available at: http://info.ag.uidaho.edu/pdf/PNW/PNW0572.pdf.

Herbicide-Resistant Weeds and Their Management. PNW 437. Available at: http://info.ag.uidaho.edu/pdf/PNW/PNW0437.pdf.

There are no grazing or feeding restrictions of wheat forage following applications of Beyond™. Do not graze or feed wheat forage to meat or dairy animals for 7 days following applications of Clearmax™.

Fungicide Applications

A foliar fungicide application is unlikely to be necessary when growing ORCF-101. ORCF-101 is only moderately susceptible to current races of stripe rust which provides adequate protection in the field under normal conditions. However, no sensitivity to current fungicides is known. When applying fungicides, follow label directions and all applicable state and federal regulations.

Yield Components:

Wheat yield can be broken down into three components; head number, kernels per head, and kernel weight. Both head number and kernels per head are determined early in wheat development, Feekes 2 – 5. Kernel weight is determined later in the growing season, Feekes 10.1 – 10.5. While environment plays an important role in yield determination, genetic factors heavily influence the way in which the three components combine to determine final wheat yield. In as such, total grain yield of ORCF-101 will be determined more by early factors influencing head size and head fertility than kernel weight and head number. ORCF-101, as compared with widely grown varieties such as Tubbs and Stephens can be characterized by low to average head numbers, a large head size, high head fertility, and lower average kernel weights (Table 8).

Table 1. Grain yield and agronomic data for 11 soft white winter wheat varieties grown across a range of environments in Oregon from 2005 to 2007.

	Grain Yield				Agronomic Data			
	Sherman, Gilliam, and Morrow Counties		Oregon Winter Elite Yield Trials		Test Weight	Grain Protein	Plant Height	Heading Date
Variety	2-Year Mean 8-Site Years	3-Year Mean 13-Site Years	2-Year Mean 24-Site Years	3-Year Mean 34-Site Years	2-Year Mean 24-Site Years	2-Year Mean 22-Site Years	2-Year Mean 22-Site Years	2-Year Mean 8-Site Years
	bu/ac	bu/ac	bu/ac	bu/ac	lbs/bu	%	in	DOY
ORCF-101	62.5	69.6	84.0	85.8	59.2	10.1	34.1	145.5
Brundage 96	64.8	68.4	88.8	89.0	59.1	9.5	33.2	145.4
Gene	57.5	67.5	78.0	83.3	57.9	10.5	30.4	141.6
Goetze	64.6	69.5	87.7	91.4	58.9	9.7	31.8	141.9
Madsen	61.6	65.9	84.9	86.0	59.2	10.3	34.1	147.5
Masami	69.6	70.4	89.6	88.9	58.7	9.4	35.8	148.7
ORCF-102	66.9	69.6	92.0	90.7	60.2	9.8	36.3	145.7
Stephens	62.1	67.9	86.6	87.6	59.0	10.1	33.7	144.3
Tubbs	62.6	66.6	89.8	90.4	58.7	9.6	36.7	146.1
Tubbs-06	64.9		91.8		58.8	9.6	37.0	145.7
Westbred 528	65.8	69.8	90.7	92.1	60.8	9.9	33.9	142.9
Mean	63.9	68.5	87.6	88.5	59.1	9.9	34.3	145.0
LSD (0.05)	3.3	2.9	3.2	2.6	0.4	0.3	0.6	0.7
CV (%)	8.7	9.3	11.2	10.8	2.1	7.0	4.9	0.9

Table 2. Grain yield and agronomic data for 10 soft white winter wheat varieties grown across a range of environments in Washington from 2005 to 2007.

	Grain Yield				Agronomic Data			
	Low to Intermediate Rainfall Zone South of Highway 2		WSU Variety Trials		Test Weight	Grain Protein	Plant Height	Heading Date
Variety	2-Year Mean 12-Site Years	3-Year Mean 17-Site Years	2-Year Mean 37-Site Years	3-Year Mean 55-Site Years	2-Year Mean 37-Site Years	2-Year Mean 37-Site Years	2-Year Mean 37-Site Years	2-Year Mean 37-Site Years
	bu/ac	bu/ac	bu/ac	bu/ac	lbs/bu	%	in	DOY
ORCF-101	67.3	71.3	96.2	101.3	59.1	11.7	34.3	152.1
Brundage 96	70.7	74.4	101.7	103.8	58.5	11.1	33.3	152.5
Eltan	72.3	71.1	99.3	97.7	59.3	11.2	36.2	157.0
Madsen	70.0	72.8	98.4	102.1	59.1	11.6	34.6	154.9
Masami	76.3	79.5	102.0	104.5	58.1	10.9	35.3	156.4
ORCF-102	75.9	77.5	105.3	108.4	59.9	11.3	36.2	152.6
Stephens	66.5	69.0	97.7	101.1	58.9	11.4	32.8	150.6
Tubbs	74.4	78.6	107.5	110.4	58.5	10.8	36.1	152.5
Tubbs-06	71.0		103.7		58.3	11.1	36.4	153.1
Westbred 528	66.7	67.5	101.1	102.4	60.8	11.3	33.5	149.4
Mean	71.1	73.5	101.3	103.5	59.0	11.2	34.9	153.1
LSD (0.05)	3.4	3.0	2.4	2.1	0.2	0.2	0.4	0.3
CV (%)	12.0	12.0	10.5	10.9	1.7	6.8	4.7	0.8

Table 3. Agronomic and disease ratings for 12 soft white winter wheat varieties grown in Oregon and Washington.

Variety	Maturity	Winter Hardiness*	Rust†		Septoria†	Crown Rot†	Cephalo-sporium Stripe†	Strawbreaker Foot-Rot† *Pseudo cercosporella*
			Stripe	Leaf				
ORCF-101	Mid-Season	3	MS	MS	MS	MS/MR	S	S
Brundage 96	Mid-Season	5	MR	MS	S	MR	MR/MS	S
Eltan	Mid-Late	10						
Gene	Early	2	MR/MS	S	S	MR	MS	MS/MR
Goetze	Early-Mid	2	R	MR	MR	MR/MS	MS	MR
Madsen	Mid-Season	5	R	MR	MS	MR/MS	MR	R
Masami	Mid-Season	5	MS		S	MR	MR/MS	
ORCF-102	Mid-Season	4	R/MR	MR	MS	MR/MS	MR/MS	R
Stephens	Early-Mid	3	R	S	S	S	S	S
Tubbs	Mid-Season	5	MS	MS	MS	S	S	R
Tubbs-06	Mid-Season	5	MR/MS	MS	MS	S	S	R
Westbred 528	Early-Mid	4	MS	MS	S	MR	S	S

* Scale: 1 to 10, with 10 being excellent and 1 being poor.
† Scale: R = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible
Data is complied from the following sources: Winter Grain Varieties for 2003, Special report 775, Oregon State University Extension Service; 2004 through 2007 Oregon Winter Elite Yield Trial Disease Ratings; and variety Characteristics, Washington State Crop Improvement Association.

Table 4. End-use quality analyses of ORCF-101 soft white winter wheat in paired comparisons with Stephens and Tubbs. Data provided by USDA-ARS Western Wheat Quality Lab.

Variety	Kernel Hardness	Break Flour Yield	Flour Yield	Flour Ash	Milling Score	Flour Protein	Mix Absorption	Cookie Diameter
	SKCS	%	%	%		%	%	mm
ORCF-101	42.1*	47.4	68.5	0.43*	81.1	9.0	56.0	9.34
Stephens	36.0	47.8	69.1*	0.41	83.1*	9.3	56.0	9.32
ORCF-101	43.3	47.7	69.0	0.43	81.5	8.9	55.9	9.34*
Tubbs	46.5*	48.4	68.9	0.45	80.6	8.6	55.7	9.18

* indicates a statistically significant increase ($p < 0.05$) based on a paired t-test.

Table 5. Grain yield of seven soft white winter wheat varieties in a planting date study at Moro Oregon in 2006 and 2007.

Planting Date	Variety								
	Stephens	Madsen	Tubbs	Tubbs-06	ORCF-101	ORCF-102	Goetze	Skiles	LSD $_{(0.05)}$
	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac	bu/ac
2006									
September 12	72.2	59.2	70.3		67.0	71.6	75.3		8.4
October 3	74.8	69.7	74.7		76.0	73.7	80.1		3.3
November 20	45.8	43.5	50.5		48.7	55.2	42.8		4.5
2007									
September 12	84.6			90.4	87.8	88.3	85.8	89.3	7.9
October 3	90.3			92.3	91.6	90.1	94.8	88.9	9.5
October 27	66.3			71.3	70.8	70.9	67.0	63.3	5.4
November 20	53.5			66.4	52.6	63.9	64.2	67.9	7.0

Table 6. Grain yield of ORCF-101 across three seeding rates at Moro and Pendleton Oregon in 2007.

Planting Date	Seeding Rate (seeds/ft^2)			
	11	22	33	LSD $_{(0.10)}$
	bu/ac	bu/ac	bu/ac	bu/ac
		Moro		
October 3	93.3	87.7	93.8	26.1
October 27	61.6	74.8	76.1	6.8
November 20	43.7	55.8	58.5	8.5
		Pendleton		
October 3	74.3	81.3	84.1	21.1
October 27	59.9	67.1	73.7	16.9
November 20	44.4	49.2	53.4	12.7

Table 7. Seeding rate conversion from seeds per square foot to pounds per acre.

Seeds per Pound	Weight of 50 Seed Sample (g)	Seeding Rate (pounds/ac)	
		22 seeds/ft^2	33 seeds/ft^2
8,000	2.84	120	180
9,000	2.52	106	160
10,000	2.27	96	144
11,000	2.06	87	131
12,000	1.89	80	120
3,000	1.75	74	110
14,000	1.62	68	103
15,000	1.51	64	96

Table 8. Yield component comparison of ORCF-101, Stephens and Tubbs/Tubbs-06.

Yield Component	Variety Comparison
Head Number	ORCF-101 < Tubbs/Tubbs-06 < Stephens
Head Size	Stephens < Tubbs/Tubbs-06 < ORCF-101
Head Fertility	Tubbs/Tubbs-06 < Stephens ≤ ORCF-101
Kernel Weight	ORCF-101 ≤ Tubbs/Tubbs-06 < Stephens

Table 9. Partial Listing of Rotational Crop Plant Back Intervals Following Beyond™ and Clearmax™ Applications

Plant Back Interval (Months)	Crop(s)
0	CLEARFIELD* Wheat, CLEARFIELD* Sunflower, CLEARFIELD* Canola, Dry Beans, Dry Peas
3	Alfalfa, Wheat (non- CLEARFIELD*)
4	Cereal Rye
8.5	Corn (CLEARFIELD* and non-CLEARFIELD* pop, sweet, field, and seed)
9	Barley[1], Oat, Onion, Sunflowers, Peanut, Watermelon
18	Barley[1], Carrot, Potato
26	Canola, Condiment Mustards, Sugar Beet, Table Beet

[1] See Beyond™ or Clearmax™ labels for soil pH, tillage system and cumulative rainfall and/or irrigation requirements that most closely approximate your production system to determine the appropriate barley plant back interval.

SOILS

John Hart, Mark Mellbye, and Neil Christensen

Reducing Phosphorus Cost for Grass Seed Production

Sharply rising fertilizer prices are accompanied by questions asking about reducing fertilizer cost for this fall and next spring. The primary way to reduce your fertilizer bill is to reduce the rate applied. Simply put: use less, buy less, and spend less.

This article provides ideas for phosphorus (P) application in grass seed production, primarily perennial ryegrass. Two points will be presented: 1) use a soil test to assess P need, and 2) put your crop on a "phosphorus diet" to reduce cost. Soil tests create confidence that P rates can be reduced without reducing yield.

Soil Test P

Soil test P is an indicator of P availability. It does not translate into pounds of available P. Think of it as a gauge or measure to answer the question, "Is enough P present to grow a crop or do I need to add P fertilizer?"

For perennial ryegrass, a predictable yield response to application of P fertilizer does not occur until the P soil test is below 12 ppm. No yield increase is measured when soil tests are above 25 ppm. When the P soil test is 12 to 25 ppm, yield response may or may not be obtained from P fertilizer application for a new planting. Recommendations based on this approach are in Table 1 and the current OSU fertilizer guide for perennial ryegrass seed production.

Table 1. Phosphorus fertilizer application rates for perennial ryegrass based on a soil test using the Bray extractant for determination of plant available-P.

If Soil Test for P is	Apply this amount of P_2O_5	
ppm	New seeding	Established stand
	lb/a	
0 to 15	40 to 60	30 to 40
15 to 25	30 to 40	0
above 25	0	0

Many growers say they don't trust the P soil test because they are not sure how much of it is available. The current economic situation may be the spark that pushes growers to prove to themselves that the P soil test is an accurate predictor of P need. Proof can be obtained by following a "Phosphorus Diet."

Phosphorus Diet

Three diet approaches provide a range in saving and perceived risk: 1) cold turkey or no P application if soil test P is above 25 ppm, 2) spend the same amount on P this year as last, and 3) reduce P application by a percentage this fall or spring—25% is a logical start. Given that the price of P roughly doubled in the last year, following the second diet approach will reduce P application by approximately 50%.

One concern voiced by growers is the possibility of a precipitous drop in soil test P if straw is baled. OSU research in the past 20 years has repeatedly shown that soil test P soil test will not "fall off a cliff" with residue removal.

One trial compared a full straw chopped to bale and vacuum sweep treatment for perennial ryegrass and tall fescue at 5 sites for three years. Soil was sampled at 0-1, 1-2, 2-3, and 3-6 inch depths. The P soil tests did not differ with treatment and the average was approximately 65 ppm for all treatments, grasses,

and sample depths. In contrast to P, the K soil test differed with straw management.

The individual soil test P values from any experiment for field will vary or "bounce" from year to year. A change of 10% is not unusual because of sampling, soil differences, and weather conditions. In addition to soil test fluctuation, don't be surprised if yield varies from year to year. Consider your past experiences with the crop. Seed yield varied yearly even when you managed in a similar manner.

Embarking on a fertilizer diet is a multi-year commitment. You can't try it for a year and have an answer. Reducing your use of fertilizer is similar to weight loss, a gradual and sustained approach is needed.

A similar concept and approach can be used to reduce potassium application and will be the topic for the next article.

POTATOES

Electronic Delivery of Potato Information by OSU
Jeff McMorran, Silvia I. Rondon, Isabel Vales, and Al Mosley

Want to know the latest information on the management of potato pests, or where you might find a used potato digger? Need to know who owns that proprietary potato variety you just planted, or how many acres were planted last year? Need a complete syllabus for a college level potato production class? It may seem incredible, but just 15 years ago these questions may have been hard to get quick reliable answers for. Things have changed!

In the mid-1990's web search engines were in their infancy, and institutions like the Extension Service were just beginning to post information on scattered websites. The need to have a single user friendly web-based clearing house of potato related information for growers and other production-oriented professionals was what inspired Dr. Alvin Mosley to create the "Potato Information Exchange" (or PIE) at Oregon State University. The goal of Dr. Mosley, a former Potato Extension Specialist, was to provide information on most aspects of production, storage, and marketing as well as links to many additional topics of interest such as weather, food and water quality, pesticides and endangered species.

A preliminary potato webpage was placed on-line and demonstrated to the Oregon Potato Commission's (OPC) Research & Extension Committee in Corvallis on December 12, 1996. In 1997, Dr. Mosley went around the state demonstrating this new 'space age' system of information delivery to growers and other agricultural professionals. At first many were skeptical, but eventually, as more and more of us became web savvy, the idea caught on. Since these beginnings, the PIE has grown to become one of the largest website of its kind, with several hundred pages of original text and over 1,400 active links to related potato sites.

Just like Disneyland, Al Mosley noted in it's début before the OPC "The Potato Information Exchange, or PIE, will never be a finished product since additions and changes will always be needed". So what's new on PIE?

IPM Section: From the beginnings the pest control section has been useful in control recommendations and displaying information of all major pests. This section has recently received a major overhaul by our Extension Entomologist Silvia Rondon. In the revised "IPM" section one can find pictures and current information on the management of insects, weeds, and diseases. She has also included some excellent new photographic material as well as links to other sites of interest. Much of the information on this portion of the PIE is derived from ongoing research that may not appear in formal publications for several years. PIE has also been linked to the OSU HAREC Entomology Program website which includes updated information, presentations, latest publications on the topics of interest for Oregon and the Pacific Northwest.

Variety Information: As you might expect, Al Mosley, who also headed up Oregon's Variety Development Program, had included a very extensive array of potato variety information on the early PIE, including variety descriptions, uses, and information on upcoming lines. But there is always room for improvements. In the last few years, information specific to variety ownership has been added via a 'Variety Identification & Ownership Chart' noting key characteristics of each variety as well as links to the owners. A Plant Variety Protection (PVP) status chart, as well as links to PAA-maintained tables showing the number of acres of each variety produced as seed each year in the USA and Canada are now present. To help growers avoid varieties known to be latent (or symptomless) to Potato Virus Y, the PAA's "Latent Virus List' has been posted on PIE.

Access To Current Reports and Meeting Dates: PIE has also become important as a way to keep the potato community current regarding OPC funded research activities in Oregon. The yearly posting of the OPC research reports by Isabel Vales can be searched by key words, author or year. Because much of this information will not be published for several years, the PIE provides one of the few means of accessing this type of cutting edge research at OSU.

If you are more into listening then reading, PIE also maintains a regularly updated 'Calendar of Events' highlighting meetings and presentations that might be of particular interest to potato growers and affiliates in the Pacific Northwest.

Organic production links: If you are into 'organic' you will be pleased to know the PIE has added impressive linkage to Organic Production sites including those involved with organic/environmental organizations, organic farms and

businesses, and organic production methods as well as OSU's own OSPUD - Participatory Organic Potato Project website.

Certification Information: Up-to-date information on seed certification in the US such as current agency contacts, summary of current rules and requirements by state, and acreage information has often been hard to locate, even on the Potato Association of America (PAA) own website, so posting or direct links to this information has been recently added to PIE' "Seed Certification" section.

PIE is very active, receiving 32,235 visits since April 2006. At the time of this writing, the site meter indicated the last 100 visits had come from 13 countries including Swaziland, Republic of Korea, and India, and that over 38 different locations within the US had used the website, five of which were in Oregon.

They say imitation is the highest form of flattery. If this is true Dr. Mosley must be pleased to see that many others have now have taken his lead and are hosting similar types of all inclusive potato information sites. Links to these sites, as you might except, are found on the original PIE. PIE has become so useful that Mosley is now in the process of converting portions of it onto the PAA website.

Other forms of electronic information delivery at OSU

PotatoNet: At OSU the dissemination of information electronically is not limited to those who go 'surfing' the net. In 2000 a new electronic mailing list/chatroom called "PotatoNet" was added to OSU's electronic information delivery system. It was designed as an informal information delivery system for all practically-oriented potato professionals. PotatoNet was originally developed by project leader Al Mosley for use by PAA scientists, but the appeal was so great that membership has been steadily broadened over the last 5 years. Selected potato growers were subscribed for the first time in 2004, and currently there are more than 500 subscribers. PotatoNet offers a huge assortment of expertise from around the world available to all PotatoNet members. All Oregon growers are welcome to join and thanks to support by OSU and the Oregon Potato Commission PotatoNet this service is offered absolutely free!

Oregon-Seed-Potato: The success of the PotatoNet prompted the development of a new electronic mailing list in 2006 called Oregon Seed Potato. This service is dedicated to assisting and supporting Oregon potato seed growers, by sending essential information related to potato production, management and research here in Oregon directly to interested parties. As with the PotatoNet, any member of the list can post questions or provide information to all other members of the list instantly. Potato seed growers, producers, processors, professional colleagues, students and university and industry administrators benefit from this service.

OSU continues to expand, update, and improve all of its methods of electronic delivery. The PotatoNet now has about 500 subscribers worldwide. Oregon-Seed Potato has around 50. Though both of these lists are open to interested parties, they do require membership approval by the list administrators to join. Members information is not made available to anyone other than the administrators. These safeguards help prevent 'spammers' from targeting list members and help protect the site from frivolous uses.

Sites of interest

Potato Information (PIE) website:	http://oregonstate.edu/potatoes
PotatoNet potato mailing list:	http://lists.oregonstate.edu/mailman/listinfo/potatonet
Oregon-Seed-Potato mailing list:	http://lists.oregonstate.edu/mailman/listinfo/oregon-seed-potato
Potato Variety website	http://cropandsoil.oregonstate.edu/crops/potatoe
Oregon Foundation Seed Project	http://cropandsoil.oregonstate.edu/fpsp/
OSU HAREC Entomology lab	http://cropandsoil.oregonstate.edu/entomology_lab/

FOR YOUR INFORMATION

CSS Ensures Scholarship for Teen
Kimberly Hannaway

With college and the accompanying bills fast approaching, Kayleen Hannaway, daughter of David and Kimberly, was told to start looking for scholarships. She searched online for scholarships offering big amounts and applied for the Zinch.com scholarship of $20,000.

Early last spring, Kayleen received an email from Zinch.com informing her that they had selected her as a finalist from 150,000 applications. Zinch said the 200 finalists were all well qualified so the finalists should vie for online votes to win the scholarship. Kayleen thought she had entered a traditional scholarship contest where grades, SAT scores, an essay, and extra-curricular activities would be compared. But with the news from Zinch, her weeks were about to change. Neither Kayleen nor her parents were thrilled with the twist the competition took to online voting. Was it safe, was it worth seven weeks of networking to rally votes, and was it for real? But, since the odds had improved immensely from 150,000 to 200 and Kayleen had already put in time and effort, she endured.

The online voting was a hybrid of American Idol voting and March Madness Basketball bracketing. Each week, Kayleen was pitted against another applicant and both were expected to solicit votes online. Online voting is perhaps intuitive for young people but requires a learning curve for less tech-savvy adults. Kayleen felt awkward asking for votes every week for seven weeks. She was even more uncomfortable with gimmicks and advertising that other students used to add supports for their campaigns. The Crop and Soil Science personnel came to the rescue by voting and requesting votes of their families, friends, and contacts. Each round ended on a Wednesday so every Wednesday morning for several weeks, family and friends of CSS would hustle for votes to carry Kayleen into the next round. The scurry and resourcefulness brought success and, on April 23rd, Kayleen was named the Sweet Diggity Dawg $20K Scholarship winner. Subsequently, there were radio and television interviews and newspaper articles that summarized the adventure. Eventually, Wednesday mornings returned to normal. Kayleen and her parents are grateful but Kayleen kind of misses the adrenalin rush.

Kayleen wishes to thank the CSS family who endured to support one of their own in this unconventional opportunity. She feels greatly blessed to be thought of so often by a group of people who put forth time and effort week after week to help her. She experienced, first hand, what a united group can do. Many were unselfishly tenacious and continued to give without expecting anything back.

Kayleen encourages other young people to apply for next year's Zinch.com scholarship contest. She would happily give advice and perhaps her address book as well. CSS could obviously make sure someone else's Wednesdays are never the same. THANK YOU!

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