

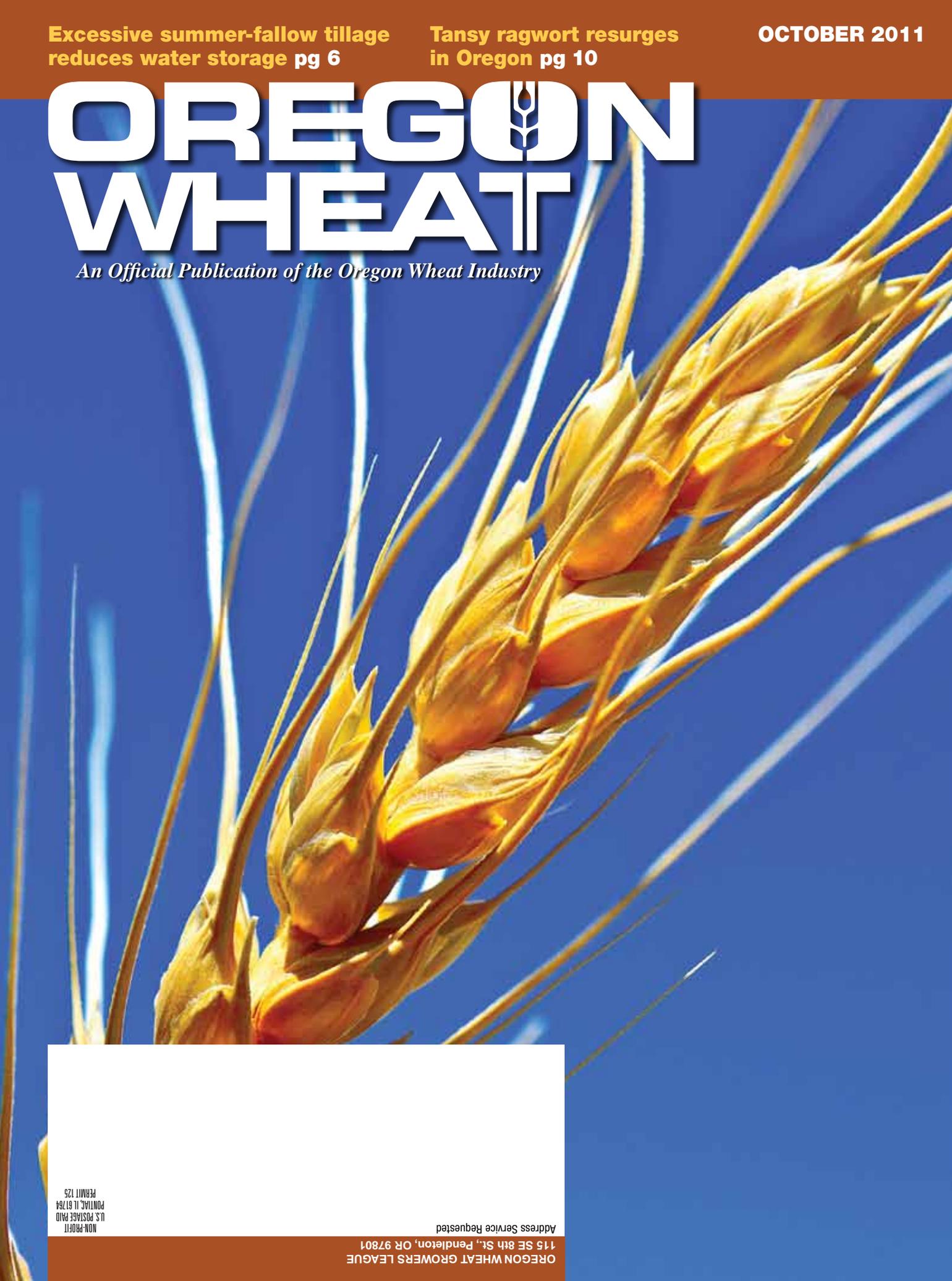
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OCTOBER 2011

OREGON WHEAT

An Official Publication of the Oregon Wheat Industry

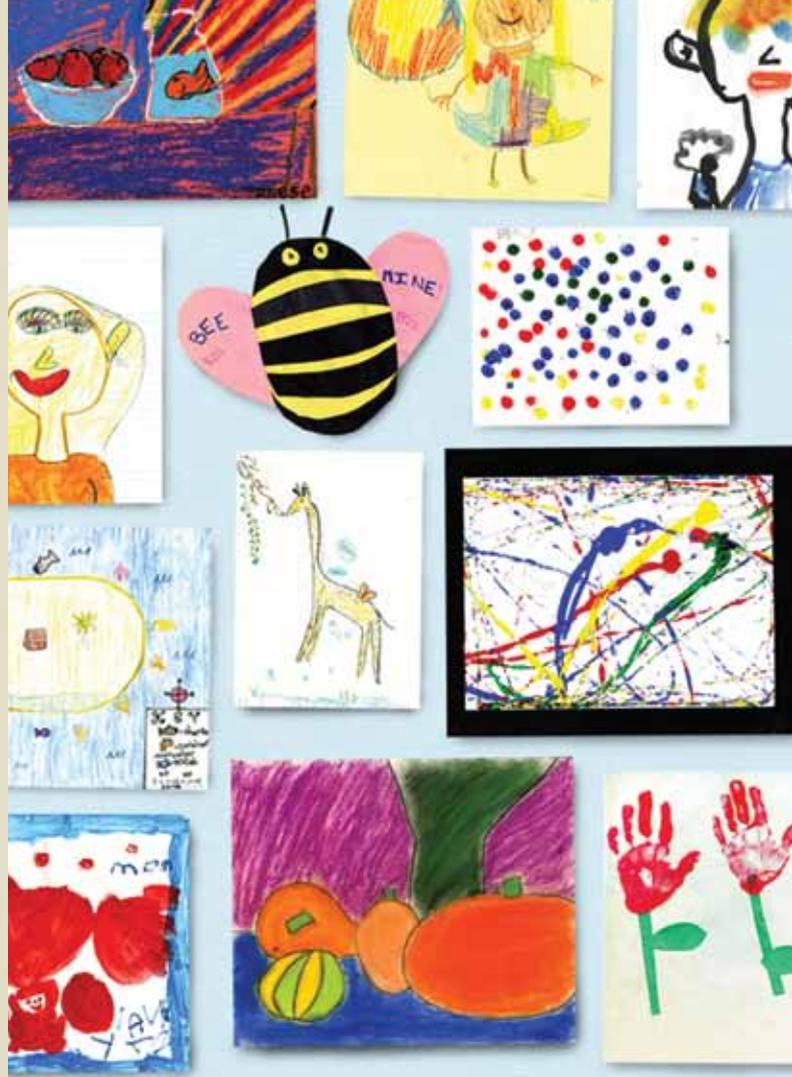


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PRESIDENT'S HALF ACRE



By Craig Reeder

With Portland prices starting at \$7 for essentially two crops and solid seeding conditions it would appear the only two things to "complain" about are tax problems and very low return on deposits.

If you are in a bad mood this morning, you must not live in wheat country. While I have heard of a few isolated issues, overall it is safe to say this crop will be one for the record books. Preliminary estimates put the Oregon soft white wheat crop at over 70 million bushels. I hear the word "fun" being used again to describe harvest. With Portland prices starting with a \$7 for essentially two crops and solid seeding conditions, it would appear the only two things to "complain" about are tax problems and very low return on bank deposits. This brings me to two issues I would like to touch on, the Farm Bill and opportunities presented by extremely low interest rates.

As many of you have read, Oregon Wheat has adopted a white paper on the Farm Bill. The OWGL and OWC worked together to construct the paper based on the well attended Farm Policy Committee meeting that was held in Condon this summer. The paper has been published twice in the newsletter and can be emailed upon request. I urge you to take another look at this paper as wholesale changes in farm programs are being considered by Congress. While that seems to occur nearly every time a farm bill is debated, one has to agree the political and economic environments are unique this go around. That is a soft way of saying we have been told by our legislators that serious cuts are coming and we better have crisp priorities for where available funds should be focused to get the most benefit for farmers. At the top of our priority list is crop insurance (understanding some changes can/should be made), followed by market assistance programs (MAP and FMD). Our priorities are in contrast to NAWG's top priority which continues to be direct payments. As always, your feedback is welcome and needed.

The second issue that I want to mention, managing your cost of capital, is somewhat of a personal soap box topic for me. Some may question its relevance, but I think it is a critical area for most growers. In a previous life, I worked very closely with, and gained some unique experience with, interest rate markets. While I don't advocate gratuitous amounts of debt or endeavor to tell anybody how to run their business, I would politely suggest (or strongly urge, as it were) you should really spend some time on your cost of capital. There are some tremendous pricing opportunities currently on both short and long-term money. The reference for most farm lending, US Treasuries, are UNDER 1% for a five year term and UNDER 2% for a ten year term. As the past few years have been solid for most of the traditional commodity producers (i.e. strong balance sheets), I have recently found lending institutions quite interested in not only new loans, but re-pricing existing balances.

Growers should also make sure they understand their operating loan pricing. Many traditional banks have implemented floors on short term funding that make them expensive when compared to banks that have the ability to use other pricing references such as LIBOR. Keep in mind that agriculture is currently one of the few solid performers in our economy. Now is a great time to take a critical look at your interest rate risk, sharpen your five/ten year operating plan, and work with your bank to structure as solid a balance sheet as possible. Steps taken now to strengthen your financial structure can pay big dividends when the market turns, as it inevitably will (I know, I know – killjoy). A strong balance sheet can also provide a buffer if farm support programs take a big hit in the next farm bill. Happy seeding and financial planning.

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Excessive summer-fallow tillage reduces water storage before, during, and after summer

Stewart B. Wuest,¹ and William F. Schillinger²

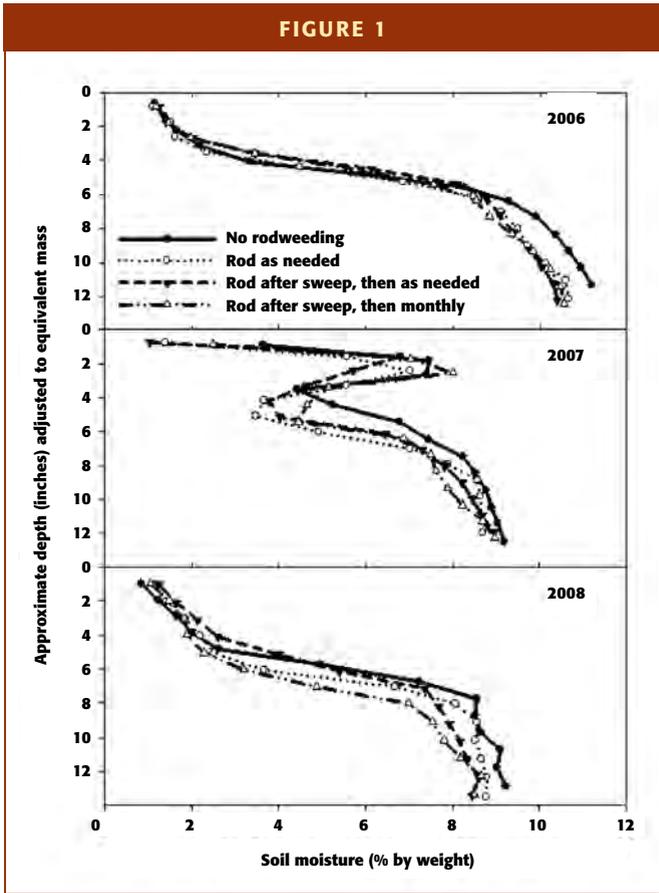
This article focuses on millions of acres in the driest portions of the Inland Pacific Northwest where tilled fallow is generally considered necessary for profitable winter wheat production. Some of the data presented here are from completed, published research projects and the rest from recent data not yet published. The ideas and principles are a work-in-progress, but the evidence and conclusions are sound enough and important enough to begin an earnest discussion.

Tillage-based fallow generally retains adequate seed-zone moisture for early (late August – early September) establishment of winter wheat, whereas sufficient seed-zone moisture is generally not present in no-till fallow by late summer. Given the variability in soil types and precipitation patterns across the region, it is often difficult to assign clear cause and effect relationships between changes in tillage and resulting seeding success. Many questions remain about what soil conditions result in the least evaporation and therefore the best seed-zone moisture by late summer.

In many locations, wind erosion is the biggest environmental problem related to tilled fallow systems. Significant advances have been made in developing tillage systems that retain 30% or more crop residue cover on the soil surface. It is generally acknowledged that these “trashy” fallow systems produce as good a result as the older method of more intensive tillage, although farmers sometimes have difficulty passing through high amounts of surface residue with existing deep-furrow drills. It is still commonly believed, however, that a relatively fine soil mulch is needed to provide a barrier to stop moisture loss during the summer months prior to seeding. A growing body of research has demonstrated that this is not true.

A recent rodweeding frequency experiment at Lind, WA demonstrated that undercutting without subsequent rodweeding actually performed better at retaining soil moisture than when rodweeded immediately after undercutting, rodweeded later in the season, or rodweeded several times. In this experiment weeds were controlled by herbicides (Figure 1).

It appears that cloddy, trashy conditions produce a mulch



with very low bulk density. Further rodweeding pulverizes the mulch, which makes it fine and flowable, but actually increases bulk density and reduces thickness (“brings the moisture line up”). Even when rain produces a crust on top of the tilled surface, a tilled mulch appears to perform best when left untouched for the rest of the summer.

The same improved performance has been found in other locations on different soil types. Tests over the past three years show that a single tillage in May or June can perform as well as more highly tilled systems. The set of graphs in Figure 2 is from four sites near Wasco, OR. At each location we compared a single pass of an undercutter sweep in early July versus the neighboring no-till field and tilled fallow field. In the upper left graph it appears that the tilled fallow (open circles) was started early enough that it prevented late spring rains from

FIGURE 2

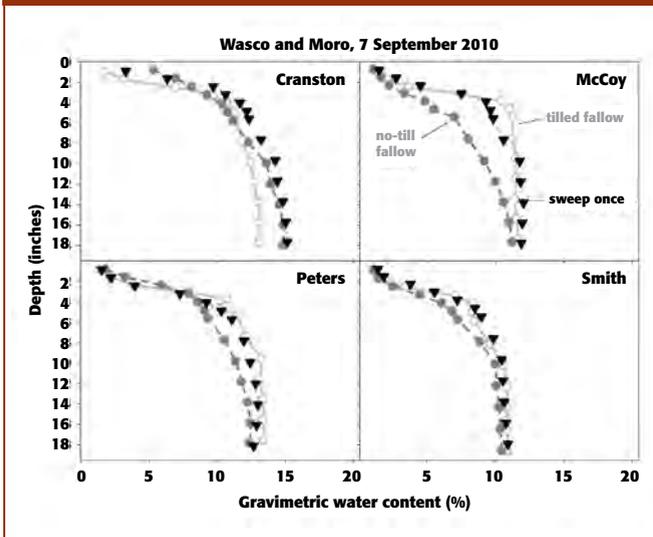


FIGURE 4

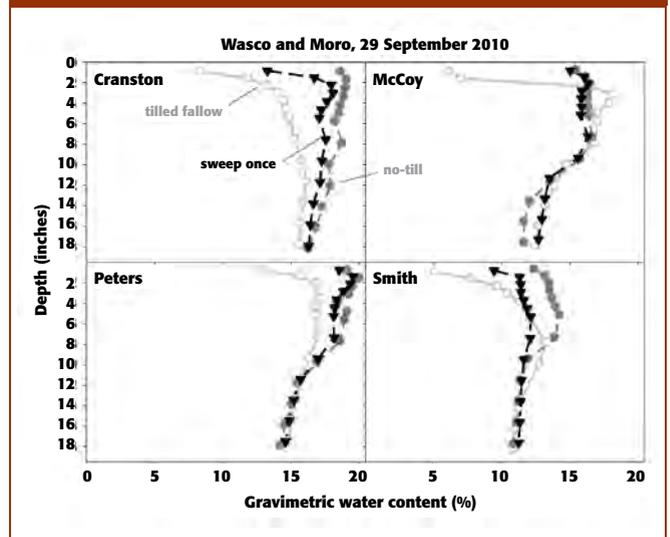


FIGURE 3



TOM MCCOY

being stored. In the other three fields the single pass with the undercutter preserved about the same amount of water as the more typical tilled fallow.

Minimal tillage fallow produced by an undercutter or cultivator leaves a very cloddy, high residue soil mulch, which can be a challenge to seed into. It can, however, hold good furrows and is unlikely to crust (Figure 3). This minimum tillage mulch also absorbs early fall rains much better than a fine soil mulch. Figure 4 shows the four fields on 29 September, after

substantial rain had fallen. Notice that no-till does an excellent job of storing precipitation, and the single undercutter pass is better than more intensive tilled fallow.

Some farmers have wondered if no-till practices can cause enough improvement in the soil surface organic matter levels and soil aggregation to create an effective evaporation barrier without tillage. It is clear that no-till improves surface characteristics on a vast majority of soils, but at least in the driest regions the accumulation of even large amounts of crop residue

is not very effective in saving seed zone moisture over a long, dry summer. (For more on surface residue and evaporation, google doi:10.2136/sssaj2010.0368 or contact the author). In many locations the improved infiltration of fall rain under no-till fallow compensates for later seeding dates.

A set of data where several tillage types can be directly compared using stringent statistical methods comes from an on-farm test near Helix, OR. Four of the treatments are shown in Figure 5. The figure shows the average of 2007 and 2008. The sweep (Sunflower with 5-ft blade) in May, followed by one rodweeding in early July, had the best moisture retention. Next was the sweep-coil pack treatment (Sunflower with 5-ft blade in May with attached coil packer) and “conventional” treatment (disk in April, cultivated in May, rodweeded if necessary in June and July). The sweep treatments have better moisture. The sweep, rodweed treatment and the conventional treatment are statistically different at four and five inches ($p > F = 0.07$).

The most surprising research finding is how effective an extremely cloddy soil mulch is at preventing evaporation. This knowledge can reduce fuel use, soil erosion, and crusting problems. Since we now control weed growth using herbicides, it is not necessary to till early in the spring. Water loss from cool, weed-free soil is minimal, so tillage should be delayed to allow for efficient water gains from spring rainfall. The ARS unit located at Pendleton is starting an intensified research project with sites throughout the driest wheat growing region of the Columbia Plateau to determine the best timing for initial tillage, and how rough and how deep tillage

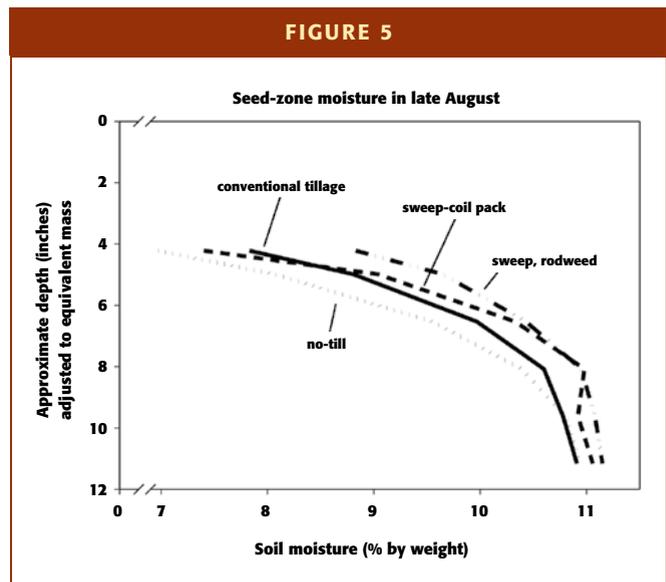


FIGURE 5. Effect of tillage treatments at an on-farm test near Helix, OR. Average of two years of data. Sweep, rodweed has significantly greater moisture than conventional tillage at 4 and 5 inch depths ($p > F = 0.07$). Sweep, rodweed treatment: 5-ft blade Sunflower in May, followed by rodweeding if necessary in July and August. Sweep-coil pack treatment: 5-ft blade Sunflower in May with attached coil packer. Conventional treatment: disk in April, cultivate in May, rodweed if necessary in June and July.

should be to maximize seed-zone moisture and total water storage. We are also collecting data we hope will support the expanded use of no-till fallow for profitable and sustainable crop production. ♦

Acknowledgements

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Tansy ragwort resurges in Oregon

The poisonous, noxious weed pops up again, but biocontrol should keep it in check

Just like a year ago, farmers and ranchers in Western Oregon this summer are noticing patches of the telltale bright yellow flowers of tansy ragwort — a noxious weed once the scourge of the 1970s. But the experts at the Oregon Department of Agriculture say it's no cause for alarm as biological control agents should keep the plant from making an unwelcome comeback to prior levels.

“The cool wet spring and early summer was good for tansy, not so good for our bio-controls,” says Tim Butler, supervisor of ODA’s Noxious Weed Control Program. “Even so, there is no reason to think we will return to what was taking place 30 or 40 years ago. It’s all part of a natural cycle.”

The equation is simple — as the tansy ragwort population grows, so do the populations of flea beetles and cinnabar moths that feed off the weed. In the end, ODA believes the good insects will always maintain the upper hand.

ODA continues to receive calls from landowners or their neighbors anxious about the return of tansy ragwort, now

in a very visible stage. The outbreaks are spotty and localized. Still, Oregonians may remember the bad old days when tansy was so invasive in Western Oregon that cattle and horse owners reported more than \$4 million in losses each year as their animals grazed on infected pastures. Too often, the leaves of tansy grew among the grasses consumed by livestock in the spring, leading to sickness and death.

At this point in the growing season, the tansy flowers are in bloom and the weed is tall enough for animals to generally avoid by eating around it.

“It’s counterintuitive to just let it go right now, but the whole premise of biological control is to allow the insects present to naturally build up on their own,” says ODA entomologist Eric Coombs.

Coombs has personally visited many of the sites where tansy has popped up this year and has found the good bugs — the biocontrol agents that help kill the weedy plant — present in all cases. This comes after intensive efforts years ago to release insects in infested areas where the flea beetle and cinnabar moth are now established as part of the natural environment. For the second straight year, a cool, wet spring, has reduced cinnabar moth populations. However, the flea beetles are still active.

“I think we’ve done our job, now it’s time to wait and let the insects to their job,” says Coombs. “It’s all a natural cycle. We will get these flare-ups of tansy ragwort that will move around from field to field depending on factors like the weather or how the field is used. It might be another year or two before the insects build up in numbers again and knock the weed back down. It would take three to five years if the natural enemies had to be reintroduced.”

Tansy ragwort has the distinction of being the only weed for which a Governor’s Task Force was created, leading to a control program housed in ODA



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ERIC COOMBS, OREGON DEPARTMENT OF AG

that has made effective use of biological control.

“Since the mid-1980s, there has been an estimated \$5 million annual benefit from the biological control of tansy ragwort throughout Western Oregon,” says Coombs. “All in all, for every dollar spent in our biocontrol program, the public gets about \$13 back in benefits due to the impact of reuniting a noxious weed with its natural enemies.”

The cinnabar moth eats the leaves of tansy ragwort. With the flea beetle working on the roots and ragwort seed fly eating the seeds, the fearsome threesome has worked wonders. It has been almost too good. Much of the weed has been destroyed over the last 25 or so years that there hasn't been enough tansy to maintain high populations of the bugs. The result the past few summers has been a sporadic but definite reappearance of the poisonous weed. While ODA would prefer a complete eradication of tansy, realistically, it is not in the biocontrol agent's best interests to eat up every last plant.

“As long as we suppress the weed below an economically damaging level, we'll be satisfied,” says Butler.

Tansy ragwort contains poisonous alkaloids that can kill livestock if in-

gested. Three decades ago, when much of Western Oregon was covered with the weed, cattle and horses were dropping in alarming numbers. Oregon doesn't appear to be returning to that scenario despite this year's resurgence of tansy. ODA will be working with Oregon State University's Veterinary Diagnostic Laboratory to see if any documented cases of tansy poisoning of livestock are reported. The last documented case goes back to 1995.

ODA officials continue to say as long as livestock are not dying due to the poisoning, the insects are doing their job at controlling tansy — even though there have been some very noticeable flare-ups. Patiently waiting for the established biological control agents to build up is still the best course of action. That's not easy for some farmers and ranchers, and it doesn't mean there is nothing they can do in the meantime to help.

“Good pasture management techniques — fertilization, prevention of overgrazing, and irrigation to help maintain the competitive advantage of desirable plants species— plays a key role in minimizing soil disturbances that lead to emergence of tansy ragwort from the seed bank in the soil,” says Butler.

In addition to overgrazing, factors

leading to the resurgence of tansy include construction, logging, fires, floods, and other events or practices in which the soil is disturbed.

Pulling or mowing are always available options, but the latter only leads to the weed growing back stronger and heartier next year. Herbicides can be used to control tansy ragwort but need to be applied in early spring before the stalks are formed or late fall after some re-growth of seedlings and rosettes.

Until then, the best advice is to practice patience and wait for the good bugs to beat the bad weeds. ♦

Reprinted from the ODA “Story of the Week” August, 2011



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Vincent Amanor Boadu

Vincent Amanor-Boadu is an associate professor of agribusiness economics and management at Kansas State University. He received his PhD from the University of Guelph, in Ontario, Canada and worked for nearly a decade as the Director of Research at the George Morris Centre, an independent agri-food think-tank in Canada. His research and outreach efforts encompass business development and entrepreneurship, technology and innovation, and strategic management, with emphasis on inter-organizational relationships.



Art Douglas

Art Douglas is a Professor and Chair, Environmental and Atmospheric Sciences, at Creighton University. He is a climate expert who has been giving mostly accurate predictions on regional temperatures and precipitation for 30 years. He is an elected member of NOAA's Office of Global Programs North American Monsoon Experiment Science Working Group. Relevant climate publications by Douglas include *Long-Term Observations for Monitoring Extremes in the Americas* and *Assessing warm season drought episodes in the central United States*.



Jim Miller

Jim Miller is the senior aide to Senate Budget Committee Chairman Kent Conrad (D-North Dakota) leading his negotiations on the next Farm Bill. Miller is also the former Under Secretary for Farm and Foreign Agricultural Service at the United States Department of Agriculture (USDA). Previously, Miller served as chief of staff and chief economist for the National Farmers Union. He also served as president of the Washington, D.C.-based National Association of Wheat Growers. Before moving to Washington, D.C., Miller operated a family-owned farm in eastern Washington.



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Should we still be doing tillage?

Tom McCoy, OWC Chairman

When I learned to farm in the mid-1970's, my father was bottom-plowing every acre. Bottom plowing helped keep cheat grass and goat grass under control and prevented the buildup of diseases such as Cephalosporium Stripe. However, it caused too much erosion. We stopped bottom plowing during the severe 1977 drought and have been reducing the amount and intensity of our tillage ever since. We typically make our summer-fallow now using one pass with a chisel plow and one pass with a cultivator — and then rod-weed only if we have to. Our surface residue cover after seeding often exceeds 40%.

Some of the best farmers in my area have recently taken the next step and have eliminated all tillage. By switching to chemical fallow and direct seeding, they are reducing wind and water erosion and often report good yields. Since I drive by chemical fallow fields every day, I often ask myself the question I will try to answer in this column. Why are we still doing tillage?



Tillage greatly increases the odds of being able to establish the wheat crop at the optimal time in late September even after a long dry summer.

Tillage was used in my area for three reasons:

1. To kill weeds.
2. To reduce the amount of surface residue from the previous crop — so grain drills and other equipment didn't plug up with straw.
3. To prepare a seedbed for the next crop.

Since glyphosate became available, killing weeds with tillage is no longer either necessary or economical. Stubble choppers, either mounted on the combine and/or pulled over the fields after harvest are a better way to reduce excess residue. The **only** reason left to do tillage is to improve the seedbed.

In 2008, Stewart Wuest, an ARS Soil Scientist stationed in Pendleton, started traveling to my area of Sherman County to study the effects of tillage on seedbed moisture.

Each fall, Stewart measures the moisture profile in the top foot of soil in both tilled fallow and chemical fallow fields. In 2009, he planted wheat at different depths in each field to test whether available moisture was sufficient to cause germination and emergence. In the late spring of 2010, he made several passes with an undercutter in each of the chemical fallow fields to see how a single tillage pass affects seedbed moisture. Stewart has an article describing his results in this issue of *Oregon Wheat* magazine.

My conclusions from observing Stewart's work are:

1. Without any tillage, chemical fallow is too dry to germinate wheat seeds until the first significant rain in the fall.
2. Tilled fallow normally has sufficient seedbed moisture to germinate seeds even before a fall rain.
3. One tillage pass is sufficient to preserve adequate seedbed moisture. Any tillage after the first pass — even a rodweeding — reduces seedbed moisture available to germinate seeds in the fall.

Tillage greatly increases the odds of being able to establish the wheat crop at the optimal time in late September even after a long dry summer.

How much will this improved seedbed moisture increase average wheat yields? Answering this question requires knowledge about the characteristics of the local area — particularly its topography, average rainfall, and elevation.

1. *The steepness of the farmland* — Planting wheat into moisture that is usually 4 or 5 inches below the soil surface requires the use of a deep furrow grain drill. Deep furrow drills don't work well when pulled across a steep slope. The packer wheels slide and cover the seeds with extra soil — reducing the likelihood of emergence. Even when tillage was used, areas with very steep slopes, e.g., much of the Columbia District in Wasco County, didn't attempt to seed into moisture. Hence, eliminating tillage and adopting chemical fallow in very steep areas should not reduce average yields.
2. *The average rainfall* — The only advantage of tillage is to allow wheat to emerge earlier when fall rains are delayed. Areas with higher average rainfall are more likely to receive significant rainfall earlier in the fall. Hence, tillage should be less beneficial in higher rainfall areas.
3. *The elevation* — Areas that are higher above sea level tend to have colder falls and winters. Hence, being able

to plant into moisture and get the wheat sprouted and up during the warm early fall is more important in higher areas.

I believe the yield loss caused by switching to chemical fallow will be less in steep, higher rainfall, and lower elevation areas.

Several years ago, I wrote an article in which I estimated this yield loss for my area. My article is available on our website. I farm near the Moro Experiment Station. Our average annual rainfall is just over 11 inches and the elevation at the Moro Station is 1,858 feet above sea level. None of our fields is too steep to seed with a deep furrow drill. I examined the rainfall records from the Moro Station over the past 30 years and found that at least ½ inch of rain occurred before the end of September in one-half of the years — so wheat planted on tilled fallow and chemical fallow should have emerged at the same time and yields should have been the same. In a third of the years, significant fall rains did not start until October and I assumed that using chemical fallow would delay emergence by a month. In a sixth of the last 30 years, fall rains didn't start until November and I estimated that emergence would be delayed two months. I then used the results of Professor Mike Flowers' study of how delayed emergence affects wheat yields. Mike's trials at the Moro Station in 2005, 2006 and 2007 indicate that late October and late November emergence will reduce yields by about 18% and 36%, respectively. Combining Mike's yield data with my estimates of how often fall rains are delayed, I estimated that eliminating tillage would reduce average yields by 13%.

To increase the use of chemical fallow, wheat varieties need to be developed that yield well even when they emerge in the late fall. We also need more study of how different fertilizer packages stimulate the growth of late emerging wheat. Larry Lutcher has done interesting work on the use of phosphorus and work like his should continue.

Finally, I've been reluctant to switch to chemical fallow mostly because of the yield reductions in excess of 30% that occur when fall rains are delayed until late-October or November. The recent availability of 85% CRC crop insurance has significantly improved the economics of switching to chemical fallow. With CRC insurance, revenue losses will be capped at 15% of average even in the one-sixth of years when rains are very late. Taking account of crop insurance, my estimated revenue loss from adopting chemical fallow is cut almost in half — from 13.1% to 7.5%. ♦

The Oregon Wheat Commission was created in 1947 by the Oregon Legislature, at the request of Oregon wheat producers. The Commission carries out research, marketing, and public education programs on behalf of the industry, with funds from an assessment on all wheat produced in the state. OWC programs are directed by a six-member board of Commissioners, appointed by the Director of Agriculture.



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Selecting for quality 8: Grain variability and the falling number test

Dr. Andrew Ross

There are perpetual questions about the reliability of grain quality tests that are applied in the marketing chain. In years with rain at harvest it is of value to review the tests used to quantify the level of grain soundness and to take a look at the variability of grain samples.

Grain variability: Replicated tests on grain rarely give precisely the same numerical answer — there is usually a distribution of values around a mean. The root cause of this is the unavoidable fact that grain is fundamentally variable. This variability arises from different sources. We all recognize broad-scale variations that affect crop quality: examples are seasonal, growth location, or varietal differences. What we usually don't see is the underlying narrow-scale variability, what I describe as *irreducible baseline variability*. Irreducible baseline variability

is fundamental to grain samples, which are collections of individual kernels with each kernel varying from the others in one or more physical or compositional factors. Narrow-scale variability occurs at the plant level: late tillers have smaller kernels and grains vary depending on their position within individual heads. Clever and painstaking work by Chris Miller at Kansas State University has shown this graphically for kernel size and hardness (Figure 1). Protein content also has its own irreducible baseline variability. For example, kernels in florets towards the end of the head commonly have lower protein contents.

When considering pre-harvest sprouting (PHS) or late maturity alpha-amylase (LMA) the levels of the enzyme alpha-amylase are of primary importance. Alpha-amylase content of individual grains within a sample affected by PHS can vary tremendously, from almost undetectable in sound grain to levels that can be over 100 times higher in grain when sprout is first visually detectable (swollen germ stage). Grain maturity is an important parameter in determining when grain becomes susceptible to PHS. Grain is first susceptible at physiological maturity (just after the hard dough stage) and becomes increasingly susceptible as ripening progresses to harvest maturity. So sources of variability in PHS, and therefore of amylase activity, range across both broad and narrow scales and include variations of maturity across a field, areas of lodged plants that dry more slowly after rainfall, and variations in maturity in single plants (early spikes are more mature than late spikes). Additionally, individual kernels within heads can vary with respect to how wet they become and to their dormancy level. The way that alpha-amylase synthesis is induced in PHS means that not only is it variable, but that the variability can

easily be unevenly distributed in a grain lot. Take the example of grain from an area of lodged plants with incipient PHS in a field with mostly erect plants, where the rest of the grain escaped PHS by drying quickly. The PHS affected grain will not be distributed evenly in a field bin and may not be well mixed even after further transfer making representative sampling vital.

Variability needs to be dealt with vigilance and procedures for systematic, representative sampling are well documented (see HGCA and GIPSA in Links). Vigilance in sampling is important for all measured traits but it is especially important for traits that can vary enormously, such as the amylase content of PHS affected kernels. For some traits, if 1% of kernels are way out of specification they don't have an undue effect: for example, 1% of kernels with 20% protein in a sample of kernels with an otherwise average protein of 10.0% only increases average protein from 10.0 to 10.1%. But take the hypothetical but realistic example of a group of sound seeds with an average alpha-amylase activity of 0.11 SKB units (a measure of alpha-amylase activity). Based on numbers well established in the literature (Perten 1964) this sample would have a Falling Number (FN) of around 305 seconds (Figure 2). Replacing 1% of those seeds with seeds with 25 units of activity (about the level at the first visible signs of sprout: Xing et al 2011), will increase average amylase activity to 0.36 SKB units, and drop the estimated FN to around 175 seconds. In another example, Brian Sorenson of the Northern Crops Institute and Jochum Wiersma, Small Grains Specialist at the University of Minnesota reported that just two visibly sprouted kernels added to 200 grams [~5500 to 6500 kernels] of sound wheat (0.03%) reduced FN by

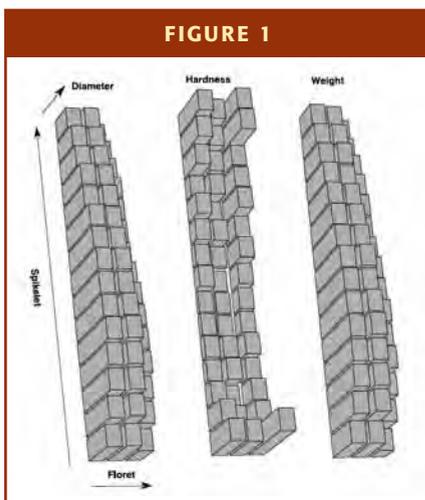


FIGURE 1: Bar graph depicting mean values of kernel diameter, hardness, and weight at positions in the spike. Reproduced with permission from the author (Miller 2008).

FIGURE 2

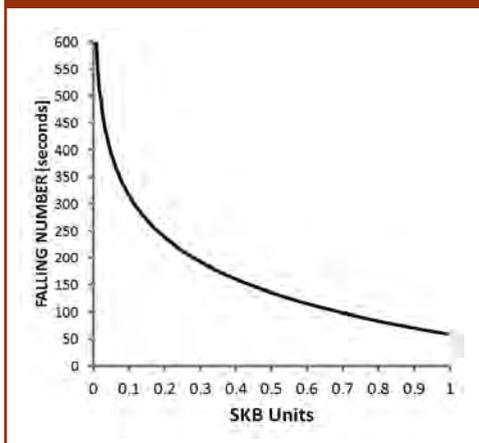


FIGURE 2: The curved relationship between whole wheat alpha-amylase activity (SKB units) and Falling Number. Adapted from Perten 1964.

100 seconds (See Sorenson and Wiersma 2004 under Links). This scenario is really not so hypothetical and is the basis for often zero or nearly zero PHS tolerance limits demanded by buyers.

The Falling Number Test: The FN test belongs to the class of tests called “autolytic.” Autolytic tests employ the starch contained in the kernel as the substrate for amylase activity. One advantage of autolytic tests is that to an approximation they mimic the situation in processing where the interplay between the starch and amylase enzyme activity in the flour determines the functional outcome. The most common autolytic instruments (FN and the Rapid Visco Analyzer (RVA); Crosbie and Ross 2007; Ross et al 1987) measure the decrease in viscosity caused by alpha-amylase cutting the starch molecules, which are large and create a thick paste in water, into small pieces that have little if any power to thicken. The FN instrument measures the time required by a plunger to fall through a paste of whole-wheat flour and water: the more amylase present and the thinner the paste and the faster the plunger drops (lower FNs). But like any other tests, autolytic tests are prone to the effects of variability. Even under the best of circumstances, that is samples with effectively no amylase present, and where sampling is not so strong an issue, the tests can appear to

have debatable repeatability. For example, in controlled laboratory testing of a succession of sub-samples over a period of 6 days (Hatcher 2005), a sample with an average FN of 360 seconds could have had subsamples with FNs ranging from 344 to 376 seconds. This may seem a lot but the variability (described here as the coefficient of variation: i.e. the standard deviation divided by the average, expressed as a percentage) was only 2.1%. This is really a fabulous result for a destructive test of biological materials. Over many years my experience has been to factor in a coefficient of variation of 5% for FN, still good for destructive testing of biological sub-samples, but would suggest a possible range of values between 325 and 395 seconds for a succession of subsamples of the sample with an average FN of 360.

It is worth noting another factor here: in destructive tests a sample is only tested once, replicated testing actually occurs on a succession of independent sub-samples taken from the grain lot. As a result, despite arguments that sampling is not an issue, whenever a test (e.g. for pre-harvest sprouting) destroys the sample, sampling is an unavoidable element of the observed variability.

The best of circumstances are not necessarily available when delivering grain. Sorenson and Wiersma (2004) highlighted some of the potential pitfalls (See Links). They concurred with my view that “when correctly run, the FN test is fairly repeatable”. However, they went on to say that contamination of the sample can decrease the FN value. We saw above how only a small amount of sprouted material can radically reduce FN. One particular source of contamination is from the grinder used to create the flour for the test. They noted that “if a small sample of undamaged wheat is ground immediately following a sample with severe sprout damage, without adequate flushing or cleaning of the grinder, substantial contamination is possible.” Although cleaning the grinder takes time it is essential after a test of material that tests with low FN.

As a result of the unavoidable variability associated with testing grain samples it is worth insisting on a FN retest if your load tests just below a FN discount threshold. It may test higher and be found acceptable at the non-discount price (NOTE: it may test lower too!).

Finally a different perspective on the variability of the FN test. There were calls at the Tri-State Commissions meeting in November 2010 for research into new test that could replace FN. There are already tests available to measure alpha-amylase activity directly. But these only measure the activity and not its impact on the starch, as do the autolytic tests. Additionally, alpha-amylase has a non-linear relationship with FN (Figure 2) or other autolytic tests. In Figure 2 you can observe that it takes only tiny increases in alpha-amylase activity in the region 600 to 250 seconds to generate large declines in FN, so alpha-amylase activity itself is not necessarily a helpful tool. Of the alternative autolytic tests the “Stirring Number” (SN) performed using the RVA, which senses viscosity using a rotating sensor, is the most viable. It is also an instrument with which I am intimately familiar as I was part of the design team. The RVA was created just over 25 years ago to address the perceived need for a FN replacement (Ross et al 1987). We reported the coefficient of variation after 4 operators tested a succession of subsamples from 10 wheat lots on 6 RVA and 6 FN machines. Each individual machine x sample x operator combination was replicated 4 times (960 tests per instrument type). For the FN test the overall coefficient of variation was 4.9%. For SN as measured with the RVA the coefficient of variation was 3.3%. Converted to FN results, even the 3.3% coefficient of variation achieved by the RVA would represent a swing of 48 seconds (336 - 384 seconds) for our sample with average FN of 360 seconds, still a problem if a specification dictated a cutoff level of 350 seconds.

There is no substitute for standardized tests done by competent operators under exacting adherence to the standard methods. However, some of the variability observed is inherent in the samples and this factor can never be dismissed when

discussing the repeatability of the FN test.

Functional effects of PHS: In PHS the large increase in the activity of the starch degrading enzyme alpha-amylase is the most striking event, and often the most detrimental to product quality. There is an optimum amount of alpha-amylase activity desired for best breadmaking performance but it is *easily*

exceeded in PHS affected wheat. Also bakers prefer to start with flour from sound grain and then add controlled amounts of alpha-amylase to achieve the desired results. In breadmaking an excess of cereal alpha-amylase activity can cause sticky and slack dough, poor crumb structure and texture, and sticky crumb. Alpha-amylase is by no

means the only problem in sprouted wheat. Increases in protease activity upon germination are also associated with sticky and slack dough, and with increased darkening of noodles through the interaction of the protein fragments with polyphenol-oxidase (same enzyme that makes cut potatoes and apples turn brown) (Edwards et al., 1987). As a result of all of the above, PHS of wheat grain is a major cause of concern for growers since the loss of quality is generally reflected in large price discounts. PHS is also a major concern for processors as there is a laundry list of potential quality defects in end-products (dark/gray colors; poor gummy textures; processing difficulties etc.) that drive the extremely low tolerances for PHS affected wheat in the marketplace. ♦

2009-10 Grant Title and Funding Level

Oregon State University Cereal Quality Laboratory, \$41,670

2010-11 Grant Title and Funding Level

Oregon State University Cereal Quality Laboratory, \$53,122



Researcher: Dr. Andrew Ross, Associate Professor

Grant Summary: This grant funds the operations of the OSU Cereal Quality Lab (CQL). The CQL contributes to successful cereal variety development at OSU by providing and interpreting quality data for our companion OSU programs in wheat breeding, genetics, and agronomy. The CQL maintained this service to the wheat breeding program through CY2010 while it was managed by the transition team of Flowers, Mundt, and Ross. The continued orderly advancement of material through the program and the advancement of appropriate lines to seed increase

attested to the success of this interim strategy. One new soft white common candidate (OR2040726) was approved for release in 2010. Independent assessments showed OR2040726 to have acceptable milling and baking quality for the soft white market class. Two soft white lines OR2071628 and OR2070870 were advanced to seed increase after confirmation of acceptable or better quality after testing of 2010 harvest material, again showing the value of the in-house quality lab and its ability to provide timely, current-season, quality data on winter wheat lines. Testing of 2010 harvest material allowed us to make a preliminary adjudication on the line OR208047P94 that came from the Tubbs x Einstein mapping population. The CQL determined that OR208047P94 had superior soft white quality primarily related to large cookie diameter at high flour protein content. OR208047P94 will be advanced rapidly pending continued surveillance of its quality attributes. The CQL continued to serve recurrent objectives related to new testing methodologies and increasing scientific knowledge of cereals and cereal foods. Key accomplishments included the quality testing of the Tubbs X NSA genetic mapping population with over 5900 individual analyses performed in CY2010. This work also served to increase our portfolio of testing methods. The quality lab again worked through large numbers of samples processing over 2500 individual analyses, in addition to the testing done on the genetic mapping populations.

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Food commodity cost pass-through to food prices not uniform

Prices for wheat, corn, and other major field crops and for agricultural products like cattle and fluid milk have spiked several times during the past decade. How much of the increased food commodity input costs are passed through to retail food prices depends on a variety of factors, including the value added at each stage in the production process.

A recent analysis by ERS researchers found that wholesale prices of beef and wheat flour generally track changes in farm prices for cattle and wheat; that is, a significant portion of farm price changes typically shows up in wholesale wheat flour and beef prices. Retail beef and bread prices, in contrast, have a more complicated and, oftentimes, less direct response to wholesale price changes.

ERS researchers analyzed 1972-2008 price data for three stages of wheat and beef marketing—farm-level wheat and cattle, wholesale wheat flour and beef, and retail bread and beef—using a model that considered both the short- and long-term relationships between input and output prices. The researchers were especially interested in investigating differences in price response when farm prices were gradually changing versus times of more dramatic shifts.

A number of differences in response behavior were found both between the two food items and among the different marketing stages. During 2000-2008, wholesale beef prices reflected an average of 53 percent of a typical change in cattle prices, while wholesale prices of wheat flour reflected, on average, 30 percent of the change in farm-level wheat prices.

The cost pass-through from wholesale to retail was generally weaker than from farm to wholesale. Retail beef prices incorporated 19 to 29 percent of a typical change in wholesale beef prices,



on average, from 2000 to 2008, while retail bread prices incorporated 16 to 21 percent of the change in wholesale wheat flour prices. The smaller pass-through rates for wheat flour and bread reflect the additional inputs used to produce a more processed item (a loaf of bread versus cuts of beef).

The timing of the cost pass-through also varied at different marketing stages. For both beef and wheat flour, most of the change in response to farm prices was passed on to wholesale prices within the first month. In contrast, the speed of response for retail beef and bread prices depended upon the direction and size of wholesale price movements. When wholesale beef prices declined, retail prices generally exhibited most of the pass-through of wholesale price changes within 2 months. When wholesale wheat flour prices were decreasing or modestly increasing, retail bread prices showed most of their response after 2 to 4 months. However, when wholesale prices surged upward, retail

beef and bread prices both showed the bulk of their response within the first month. ♦

Edward Roeger, eroeger@ers.usda.gov

Ephraim Leibtag, eleibtag@ers.usda.gov

This finding is drawn from . . .

How Retail Beef and Bread Prices Respond to Changes in Ingredient and Input Costs, by Edward Roeger and Ephraim Leibtag, ERR-

112, USDA, Economic Research Service, February 2011, available at: www.ers.usda.gov/publications/err112/

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1. 2012 Farm Program Development
2. Crop Insurance
3. Available Legal Workforce
4. Educate growers, county commissioners, FSA county committees on SURE program and process of county disaster determination.
5. Transportation Issues Specific to Movement of Wheat/Barley by Growers
6. Jetty Repair – Federal Funding Request

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1. Privatization of Wheat Breeding Programs
2. Research Priorities and Appropriate Funding — Public Awareness Campaigns
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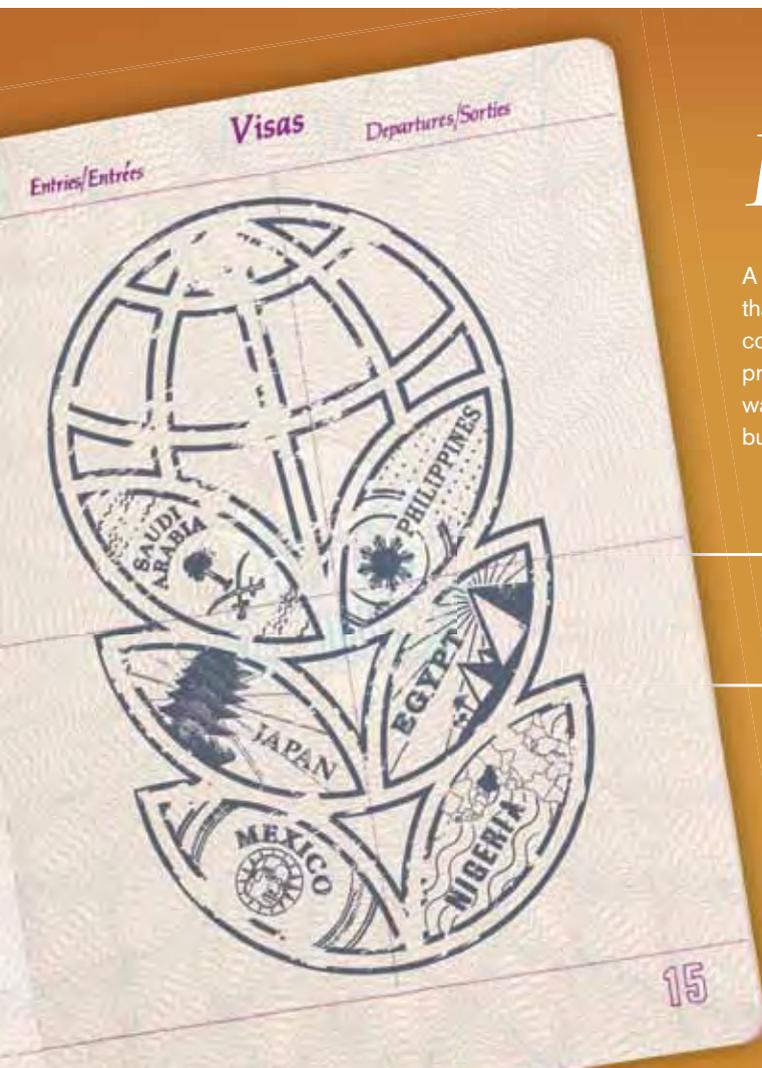
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Another great reason to go with the grain

The connection between adequate folic acid intake and the prevention of some birth defects has long been understood. Enriched grains, such as white bread, pasta and rice, have been fortified with this essential B vitamin since 1998, and since that time, the rate of birth defects in the U.S. has decreased by approximately one third.

Despite this enormous benefit, researchers pondered the age-old question: can there be too much of a good thing? A handful of studies have explored this notion, calling into question if too much folic acid consumption can

have a negative impact on one's health, particularly in terms of colorectal cancer.

To address this matter, a recent study published in the July issue of the journal *Gastroenterology* examined cancer rates since the government-mandated fortification of enriched grains began in 1998. Turns out, rather than being a risk factor, eating more enriched grains to increase intake of folic acid can actually be protective against developing colorectal cancer.

These findings can be added to the long list of health benefits from grain foods and give us all another reason to "toast" to good health! ♦

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Have you visited the Oregon Wheat website lately?

The official website of the Oregon Wheat industry has been remodeled to reflect the unity and cohesiveness of the industry as a whole.

The newly remodeled site, at www.owgl.org, features sections for producers, buyers, and consumers.

The **Producers** page features daily marketing updates from the PGG/MCGG marketing team; and will provide crop updates, crop quality data, research, and legislative news as they become available.

The **Buyers** page will host crop quality, research, and marketing information for milling and baking teams and other potential buyers.

The **Consumers** page houses the history of the wheat industry, kids pages, recipes and other general information.

The site will continue to provide a calendar of events and the extensive list of related website links visitors have come to expect.

The **Members Only** Portal will be home to all things important to our members, such as the bi-weekly newsletter, and links and information on OWGL affinity programs.

Not a member? Join today! An application is included on page 21 of this issue of *Oregon Wheat*.

Funny face pizza snacks

These mini pizzas are great for after school snacks. They're quick and yummy! Kids will have fun creating their own pizzas.

Ingredients:

- 4 English muffins, split
- 1/2 cup pizza sauce or low-fat pasta sauce
- 3/4 cup part-skim shredded mozzarella cheese
- Vegetables and ham or pepperoni

Directions:

Preheat oven – 350 degrees
Lightly toast English muffins in toaster. Arrange on a baking sheet and spread each muffin with sauce, then top with cheese. Cut vegetables and meat into shapes as suggested below. Bake for 12 to 15 minutes or until cheese melts.

Suggestions for faces:

Eyes: olives, mushrooms or carrot strips

Nose: cherry tomato half, zucchini slice, mushroom, pepperoni or ham

Mouth: bell pepper slices or carrot strips

Hair: strips of ham, cauliflower or broccoli florets cut in small pieces

Servings: 8

Calories/Serving: 190

Nutrition: (includes pepperoni),
One serving provides approximately:
190 calories, 23 g protein,
20 g carbohydrates, 3 g fiber, 2 g fat,
6 mg cholesterol, 42 mcg folate,
3 mg iron, 659 mg sodium.

Source: *Wheat Foods Council*



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