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The Cereal Sentinel

A newsletter for Treasure Valley cereal producers

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Topics: Page

Important Dates:

Parma Station Field Day	July 11, 2000
Malheur Station Field Day	July 12, 2000

The goal of this newsletter is to serve the best interests of Treasure Valley cereal producers. It will be issued periodically as information warrants. Correspondence and inquiries should be addressed to: **Parma Research and Extension Center, 29603 U of I Lane, Parma, ID 83660 (208-722-6701 Ext. 216) (Fax-208-722-6708) (Email** bradb@uidaho.edu). **The *Cereal Sentinel* is made possible in part by a grant from the Idaho Wheat Commission.**

Brad Brown

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Cereal Pests

Cereal Leaf Beetle

The cereal leaf beetle (*Oulema melanopus*) is well established in the Treasure Valley. Beetle populations were confined to the Western edge of Ada County just two years ago. They advanced across Canyon County and crossed the Snake River into Malheur County in 1999, and are now being found in some of the same areas as last year. Adults and eggs were reported in the Nampa area as early as April 20 this spring. The mild winter and relatively warm spring thus far have apparently hastened egg laying.

The beetle larvae, which cause the most serious damage, are yellowish brown but they cover themselves with a mass of dark, slimy, fecal material for protection. The slime is easily shed and comes off readily on pant legs.

Larval feeding is distinctive and easily identified. Larvae feed on the surface green layer of leaf mesophyll cells between leaf veins, which causes a narrow feeding strip. Thus, the feeding is concentrated in strips rather than dispersed and does not extend entirely through the leaf.

Threshold populations should govern control decisions. Wheat, barley, and oats can tolerate a fair amount of feeding without it affecting yield. The larval feeding is quite evident and it's easy to over react to this pest. Prior to the boot stage the threshold is three eggs or larvae per plant. After the boot stage the threshold is one larvae per flag leaf. Control is not warranted if the thresholds are not exceeded. Wheat prices are poor at present and growers should consider carefully whether to spend the extra money for controlling the beetle population.

Control recommendations are available in the Pacific Northwest Insect Control Handbook (available from Ag Publications at 208-885-7982 or your local Cooperative Extension Office). If control is warranted several insecticides are registered.

For more details about the beetle consider ordering "**The Cereal Leaf Beetle – A New Pest in Idaho**" CIS No. 994, available from Ag Publications. The text of this publication can also be viewed on the Ag Communications website (http://info.ag.uidaho.edu/) by browsing the online catalogue. Although the text of this publication can be viewed and downloaded, unfortunately the pictures of the beetle can neither be viewed or downloaded.

Beyond the damage that the pest's feeding can do to our cereals, there are important marketing implications regardless of whether the pest is present in your field. Wheat and barley from Idaho counties known to have previous infestations can't be shipped to California from this area without fumigation, except from December 1-April 1, due to that state's quarantine.

Fortunately, the cereal leaf beetle is susceptible to biological control. Egg and larval parasites used with success in the mid-west and Utah have been introduced in southern Idaho by Mike Cooper from the Idaho Dept. of Ag. Egg parasites have been less effective in Idaho. Larval parasites were released at sites with heavy infestations in the spring of the last two years. If more parasites are available they will be released at appropriate sites this spring. Should you have the leaf beetle in your area and would like to pursue a release of parasites contact Mike Cooper at 208-332-8620.

This pest is not a particular problem in areas with a history of its presence and where effective biological control agents were introduced. But until these parasites are firmly established we need to survey for the beetle and compare their population numbers against the established thresholds.

Winter Grain Mite

Will Cook, Gem County Ag Extension Educator, identified a new pest in wheat. The winter grain mite, *Penthaleus major* (Duges), was found in winter wheat. Other hosts include other small grains and grasses. It is more of a problem on turf typically than it is small grains. It has also been found on legumes and vegatables.

The adult mite is black with red legs. There is a reddish orange spot surrounding the dorsal anus. It feeds primarily during the winter and early spring and spends the rest of the growing season in the egg stage. There are two generations. We are probably seeing the second generation now as the first generation feeds in December and January. It is most active between 40 and 70°F.

This appears to be a heat avoiding pest, as it moves from the leaves to the crowns of grass plants during the warmer times of the day. They feed at night or during cooler cloudy days. They move into the soil, sometimes several inches, in order to avoid the heat during hot days.

It is not a significant feeder of winter wheat in regions where it is better known and seldom requires any control measures. The mite feeds on the sap after rasping the leaf surface. The rasping and resultant loss of chlorophyll and dessication can cause a silvery appearance in heavily infested crops. Young mites feed on leaf sheaths and tender shoots but adults feed higher up on the plant. Economic thresholds for control are several mites per plant. Crop rotation is helpful.

Excellent pictures of the pest are available on the following websites:
http://www.ipm.ucdavis.edu/PMG/r730400111.html

and http://agweb.okstate.edu/pearl/insects/crop/f7176.html. None of the web sites that I found had extensive discussions of this pest as it appears to be a non-issue for most areas. However, should you find the pest you might report the level of infestation to your local Cooperative Extension agent.

Barley Stripe Rust

Barley Stripe Rust (*Puccinia striiformis*) was not an issue in the 1999 season fortunately. If you remember, there was significant stripe rust in 1998 and some fields were hayed rather than harvested for grain. Barley test weights plummeted that year in part because of the stripe rust, though high temperatures during July also contributed.

Reports from Lee Jackson, California Cereal Specialist, indicate significant levels of stripe rust in susceptible varieties in the Sacramento Valley in mid April. That means there is inoculum upwind of our area. That inoculum could be trouble for our barley if the right conditions exist here for it's development. Those conditions include sporadic showers or dew, high humidity, and temperatures between 50 and 60°F.

Chemical control of stripe rust may be warranted depending on the value placed on the crop, the stage of growth, and the cost of the control. The earlier the infection the greater the damage. Scouting to identify stripe rust incidence is a key to minimizing the damage if control is warranted. The earlier the detection the greater the options for control. For example, finding infection prior to flag leaf emergence would enable Tilt to be used at flag leaf emergence. Tilt is not registered for use on barley after awns (beards) are visible. Again this year, Folicur received a section 18 emergency exemption and can be applied up to 28 days before harvest. There is no labeled control later than the Folicur window. Thus, the only opportunity for control is early in the reproductive stage, either prior to flag leaf emergence or shortly after heading, so early detection is essential. No fungicide will be of any benefit if leaves are already heavily rusted.

Recommendations for stripe rust control in barley are currently patterned after that of wheat. For wheat, control of stripe rust with fungicides is not considered economical after flowering . But malting barley may differ from wheat because kernel quality is a greater issue with malt barley. Kernel quality for malting essentially dictates whether the crop is marketed for malt or feed barley. With malt barley commanding as much as a dollar a hundred more in price, the economics for malt barley could be quite different than for wheat.

The Idaho Barley Commission is supporting research on late season stripe rust control in malting barley to determine the economics of fungicidal control. This research should also benefit feed barley producers. Dr. Robert Forster, Extension Plant Pathologist, will have trials located in four areas of the state to examine the efficacy and economic benefits of late season fungicides.

Barley grown for seed is the most likely to justify fungicide application in western Idaho based on its higher price and potential economic return. The cost of chemical control is likely to exceed $11 per acre, and these costs do not include the application cost.

Winter barley was in the boot stage at Parma as early as April 26. Winter cereals are early this year as compared to 1999 and this may help them avoid early infections and the associated yield loss. There was no stripe rust present in the Cooperative Extension Winter Barley Nurseries at Parma on April 26.

Barley stripe rust has changed the complexion of barley variety selection. Whereas six row varieties have historically been the most productive in the absence of stripe rust, two row varieties have better tolerance and yield as well or better than six row varieties with appreciable stripe rust present. Also, greater strides in the last two decades have been made in the improvement of two row spring barley yields than with six row varieties. There is not the difference in irrigated two and six row spring variety performance now that there was 15 and 20 years ago.

All this is to say that in the future, the best control for barley stripe rust will be variety resistance. Until we have stripe rust tolerance in six row varieties comparable to the better two rows, the best current choice with the uncertainty of stripe rust is probably two row types.

There is limited choice of six row varieties with stripe rust resistance. There are two winter varieties, Kold and Strider, and one spring, Tango. Tango is essentially the same as Steptoe, with all its shortcomings, weak straw and poor feed quality.

Some reports indicate that mixing resistant and susceptible varieties will slow the development of stripe rust in susceptible varieties. The same probably applies to our area but we have not tested this strategy for western Idaho.

It would be helpful to those working on this disease to know the strains present. If you see barley stripe rust contact your local Cooperative Extension Educator. They can assist you in forwarding leaves with the symptoms to Dr. Roland Line, USDA-ARS Plant Pathologist, 361 Johnson Hall, WSU, Pullman, WA 99164-6430 for appropriate strain identification. Dr. Forster would also like to know if stripe rust is present in the Treasure Valley (208-423-6603; forster@kimberly.uidaho.edu. If you aren't sure whether it is stripe rust, just rub your finger across the suspect leaf; stipe rust will leave a deposit of light orange colored spores on your finger.

Increasing Hard Red Wheat Protein

Hard red spring (HRS) wheat acreage increased in the Treasure Valley from 1997 to 1999. Up to 18.5% of all spring wheat planted in the Treasure Valley for the 1999 season was HRS. HRS wheat was less than 3% of the spring wheat planted in 1997. The reason for the increased interest in the hard red class of course was price.

Market prices a year ago last fall were as much as $1.50 per bushel over soft white prices, that is, if you could market 14% protein HRS. The price difference came down in the spring of '99 but was still at least $.85 per bushel higher. By comparison, prices lately have been running closer to a $1.00 -$1.15 or more a bushel higher than soft whites (again, if the HRS is 14% protein).

Despite the current higher prices for HRS than for soft whites, there may be dampened enthusiasm for the HRS this year due to the discounts received last season for HRS wheat with less than 14% protein. It is too early to know what the actual planted acreage will be but HRS sales in the Treasure Valley are down from the previous year. Low protein in the HRS was the rule rather than the exception in 1999 and there were probably a number of reasons why.

1999 Results

An informal survey was conducted this spring and we obtained the results for 32 HRS fields or field combinations. Of these, 14 were furrow irrigated and 18 were sprinkler irrigated. Late season N was applied to all but eight of the fields using rates ranging from 20 to 100 lb N per acre. The total N applied for the season ranged from 120 to 230 lb N per acre.

Of the 32 fields, only 5 had wheat measuring 14% protein. The protein average for all the fields was only 12.2%. The most striking result was the difference in protein for the furrow (11.1%) and sprinkler (13.3%) irrigated wheat. Yields for furrow irrigated wheat (88 bu/A) were not much different from sprinkler irrigated wheat (91 bu/A). Why the difference in protein?

More total N per acre was applied to the furrow irrigated wheat than the sprinkler irrigated wheat (189 vs 141 lb N/A). Likewise, more N was applied as late season N to the furrow irrigated wheat than to the sprinkled wheat (55 vs 39 lb N/A). Yet, despite the higher total and late season N rates on furrow irrigated fields, protein was considerably lower than with sprinklers.The late season N applied under furrow irrigation was applied in a variety of ways including topdressing by air, topdressing by cart, and water running the N. There was no late season N applied as a foliar spray.

Furrow Irrigation Dilemma

It appears there were some gross inefficiencies involved in the early or late season N applied to furrow irrigated wheat. The lack of effectiveness may be related to the type of irrigation system, the type of fertilizer used, weather conditions or various combinations of the above.

For late topdressed N, only rainfall would have been effective at moving the N to depths that would have facilitated uptake by wheat roots. Unfortunately, there was little rain in late May and the only significant rain in June was the first week. Even the half inch recorded on June 4 at Parma would not wet dry soil to a significant depth.

The wetting front from furrow irrigation does not lend itself to incorporating topdressed N. To make matters worse, wetting the soils underneath topdressed urea N could exacerbate volatile losses of N from the surface. Water run N is always a problem in terms of how much actually stays on the field or the uniformity of its distribution. With furrow irrigation there is also greater potential for early season available nitrate-N to leach beyond the roots. Coarse textured soils are particularly vulnerable.

All these scenarios point out the inherent risks involved in producing high protein HRS wheat under furrow irrigation. Of the five fields with 14% protein or better, four were sprinkler irrigated. The one furrow irrigated field with 14% protein was taken out of pasture and received 100 lb N per acre of late season N. Though it's possible to get 14% protein in furrow irrigated HRS wheat, the odds were against it under last season's conditions.

The dilemma for furrow irrigated HRS producers is real. How do they apply all the N necessary for not only maximizing yield but also increasing protein to levels higher than normally associated with maximum production? They can't apply high N rates as a one time foliar spray without causing excessive leaf burn. All the N can't be applied preplant without risking more lodging and the associated yield losses. Topdressed N applications later in the season without significant rainfall for incorporation are not very effective as was amply demonstrated in the 1999 season. And water run N wasn't effective either in 1999.

With last year's experience fresh in mind, my suggestion for those brave souls risking HRS under furrow irrigation is to apply preplant 100 to 110% of the N required for maximum production and apply the N required to boost protein, if needed, at heading as a foliar spray. If all the N required for yield was not applied preplant, use any herbicide application as an opportunity to apply additional N during the vegetative growth stage.

If the N required to increase protein to 14% is not greater than 30 lb N/A then apply Solution 32 as a foliar spray bewteen heading and flowering. Use a straight urea solution if more than 30 lb but less than 45 lb per acre is required.

If more than 45 lb N/A is needed due to inadequate N applied earlier then none of the alternatives are desirable. You can apply a higher foliar N rate and risk the leaf burn and yield reduction. You can apply two separate foliar applications and double your application costs which may be cost prohibitive in some seasons. You can topdress or water run N but those options weren't very effective in 1999. Finally, you can forego applying any more N and risk the low protein discounts. Furrow irrigated HRS growers would do well to avoid the situation by providing sufficient N earlier.

N Required for Yield

For both furrow and sprinkler irrigated HRS, one of the keys to managing late season N for high protein is to insure that sufficient N has been applied for maximum yield during vegetative growth. If the N required for maximum yield is not available to the plant before the late season N is applied for increasing protein, the late season N may be used in part for yield enhancement. You can't argue with higher yield, but the higher yield may come at the expense of higher protein. To the extent the late N is used for increasing yield, it may be that much less N for boosting protein. It is likely that both yield and protein will increase if insufficient N is available for maximizing yield. But protein levels, though higher than they would be without the late N, may not be high enough to avoid low protein discounts.

The HRS this past season with 12.5% protein or less clearly did not receive adequate N for yield, much less high protein. These results are consistent with other surveys. Protein surveys conducted by the Idaho Wheat Commission have indicated that a good portion of our soft white wheat is underfertilized with N. It should come as little surprise then that some of our HRS production is also receiving less than it needs for maximum returns.

The average N applied either preplant or early in the season ranged from 50 to 180 lb per acre, and averaged 116 lb/A. The early season N applied in relation to the bushel yields (early N per bushel ratio) ranged from 0.63 to 2.04 in the survey, averaging only 1.27 for all fields. In fact, the early N per bushel ratio was only 1.11 for sprinkled HRS, well below the 1.4-1.6 suggested by the UI fertility guide. The actual value is undoubtedly somewhat higher given the fact that residual N was not reported and thus could not be included.

It appears overall in the survey that not enough early N was supplied for maximum production. We can't expect low to moderate late season N to boost protein to 14% when protein is inordinately low to begin with due to insufficient N added earlier for yield. Estimating the N required for yield is critical then for effective N management and producing high protein HRS.

One of the problems with wheat production in general is that so little soil testing is used to measure the residual N remaining from the previous crop. That makes it difficult to be very accurate about predicting the N required for maximizing yield. Without measuring soil test N, estimates of the N required are frequently too low.

The current UI fertilizer guide for spring wheat suggests that for HRS all but 25-30 lb of the total N requirement should be applied preplant with the rest applied as late season N. That split may be appropriate if all but 30 lb of the total N requirement is provided earlier. The survey results preclude evaluating this split because it is not clear whether all but 30 lb of what was actually required was applied previously.

Take the sprinkler irrigated HRS for example, where we can assume that the early and late season N was used more effectively for yield and protein than in the furrow irrigated HRS. An average of 39 lb N/A was applied to the sprinkled HRS and watered in. But protein averaged only 13.3% for sprinkled HRS. Was the total N applied adequate for both yield and high protein? Apparently not .

How much N is enough to increase protein?

We know it takes more N to increase protein in irrigated wheat because yields are higher. Is also takes more if we have to satisfy the requirements for both yield and protein. Just how much N does it take?

The late season N applied in the five fields with 14% or better protein averaged 80 lb per acre. No wonder there was so little late season N applied as a foliar spray. This N rate regardless of N source would have burned the upper leaves and reduced yield. By comparison, the average late season N rate for the other fields (those with less than 14% protein) was only 37 lb N/A.

Also, the total N applied (both early and late) per bushel of wheat harvested averaged about 2.2 for the high

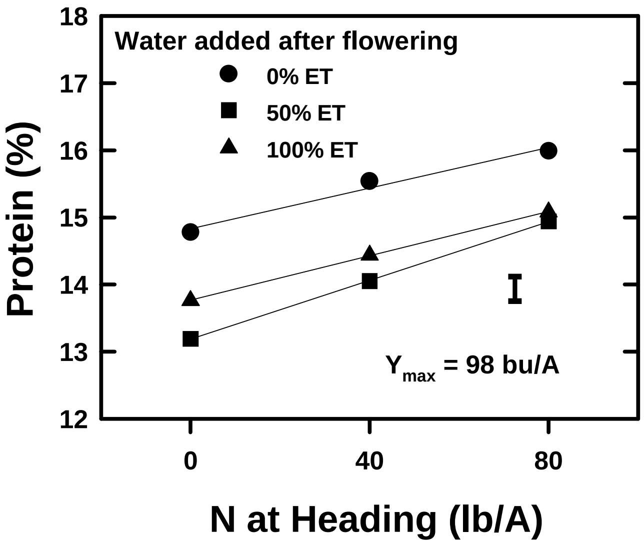

Figure 1. HRS protein response to late season N at heading as affected by the percent of ET replaced by irrigation after flowering.

protein fields and only 1.72 for the low protein fields. The 2.2 value was essentially the same as was found for 14% protein HRS wheat in the irrigated central Oregon area of Madras in 1999.

The 2.2 lb N per bushel value associated with 14% protein HRS is certainly more than is required for maximum irrigated wheat yield, particularly when you consider that no residual or soil test N was taken into consideration.

Our research trials, many of them supported by the Idaho Wheat Commission, suggest that the protein response to late season N is linear. That is, the protein increase is directly related to the amount of N applied. This was true for a variety of moisture conditions during grain fill (Fig. 1), for different hard spring wheat varieties and planting dates (Fig. 2), and for different N sources (Fig. 3). The protein increase with late season N may differ depending on the conditions, but as long as protein was below 16% the increase was consistent for each increment of late N added.

The protein increase with 40 lb/A of late season N has ranged from as little as 0.5 to as much as 1.4% protein when the initial protein was about 13%. The protein increase will depend mostly on how deficient the plant is in N. Increases can be much greater than the 1.4 % reported above if sufficient N was not applied earlier to satisfy the requirements for yield.

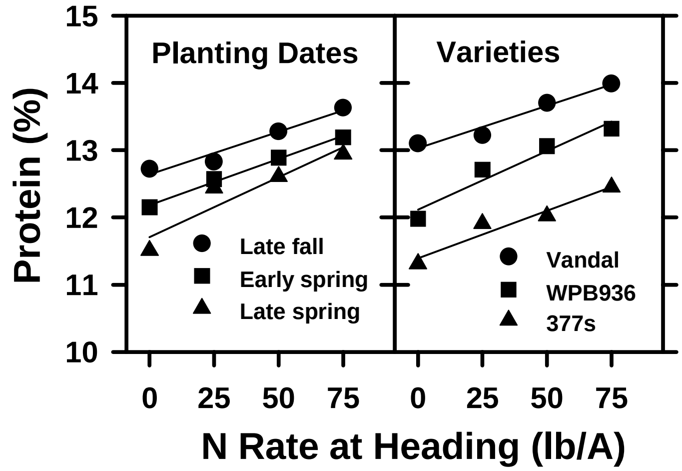

Figure 2. HRS protein response to late season N as affected by planting dates and varieties. Parma, 1999.

Predicting Protein

An accurate estimate of protein would be of value in that low protein estimates could signal the need to apply late season N for increasing protein. Conversely, high protein estimates could preclude the need for applying additional N.

I reported in the ***Cereal Sentinel*** last year at this time a means to predict the protein at harvest from flag leaf N contents at heading. The information also included a means to predict the protein increase from a given late

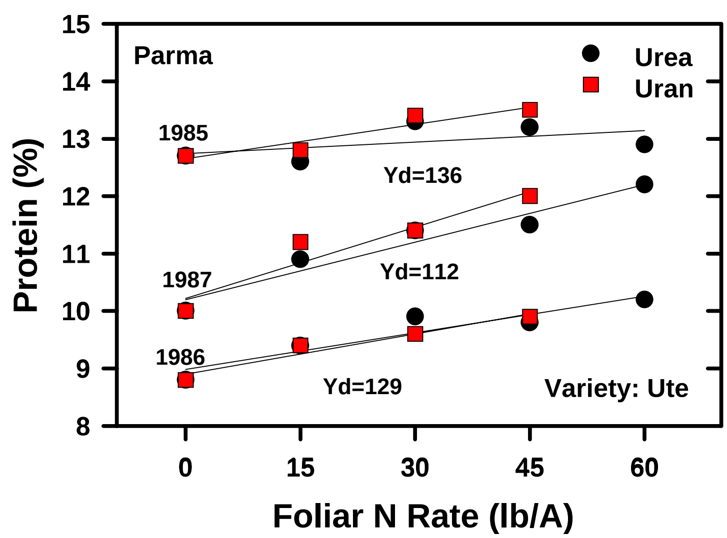

Figure 3. The protein response of hard red winter wheat to foliar N source and rate. Parma, 1985-87.

season N rate of 40 lb/A. Basically, if flag leaf N content was at 4.2-4.3% N, the protein increase from 40 lb N/A was only about 0.5% protein in the southern Idaho study. A later study in Montana identified essentially the same threshold of 4.2-4.3% N. Both studies suggested little if any protein increase with a 40 lb/A rate if flag leaf N contents at heading were above 4.5% N. But in neither study were late season N rates higher than 40 lb/A evaluated.

I received reports during the spring of 1999 of flag leaf N contents as low as 3.0% at heading in commercial HRS fields. These flag leaf N values reflect very low plant N contents and were associated with protein levels at or below 11%. When plant N contents are this low, it is difficult to apply enough late season N to increase protein to 14%. The application of 50 and then another 30 lb N/A did not raise protein to 14% in this field.

The SPAD Chlorophyll Meter has also been evaluated for predicting protein at harvest. The SPAD meter is a small hand held instrument that measures the light transmittance through a leaf. The less light transmitted of certain wavelengths, the higher the chlorophyll content. Higher chlorophyll content is related to higher N content and for wheat, higher yield and/or protein.

Mal Westcott in Montana collected SPAD meter readings at heading from irrigated HRS fertilized previously with various N rates. SPAD readings themselves were affected by individual sites and had less value than calculating the relative SPAD value, or the

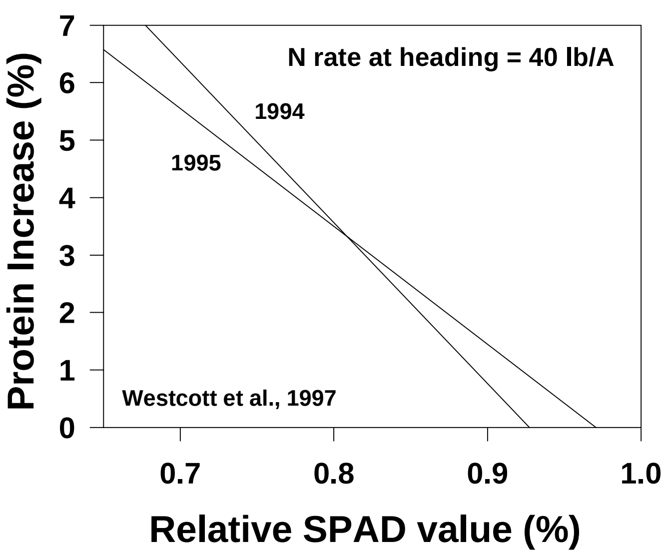

Figure 4. The HRS protein increase from 40 lb N/A applied at heading as related to the relative SPAD value (percent of maximum) at heading.

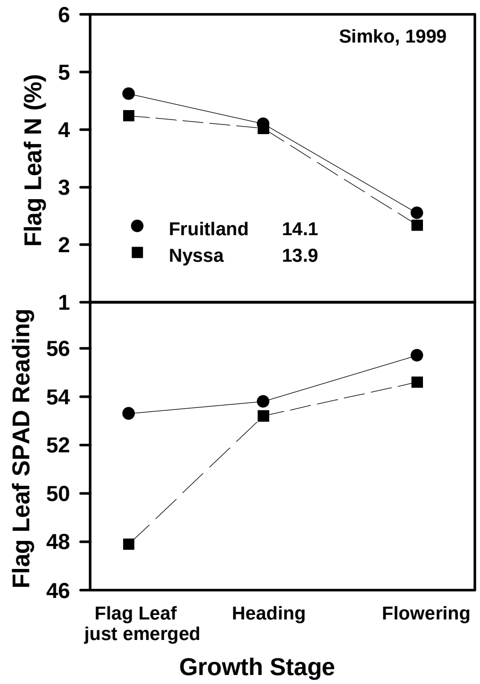

Figure 5. Flag leaf N contents and flag leaf SPAD readings as affected by growth stage for two locations.

percent of the maximum SPAD reading obtained at any given site. The relative SPAD values were reasonably well correlated with the increase in protein from 40 lb/A of late season N. The relationship between the relative SPAD value and the protein increase in two years is shown in figure 4. There was some difference in the SPAD reading - protein increase relation for the two years. The protein increase response was greater in 1994 than 1995.

Ben Simko, Extension Ag Educator in Malheur County OR collected SPAD meter readings at flag leaf emergence, heading, and flowering during 1999 from three Treasure Valley HRS fields. He found considerable variability in SPAD readings between sampling dates in the same field. Whereas flag leaf N contents declined as the plant developed from flag leaf emergence to flowering, SPAD readings tended to increase (Fig. 5).

This points out the importance of either collecting the flag leaf samples as close to heading as possible or knowing as closely as possible the actual growth stage at which the samples were collected or SPAD readings taken. If the sample is collected or reading taken between growth stages, at least the value obtained can be interpreted more accurately if the previous or following growth stage is accurately recorded. Otherwise misleading interpretation of the values could lead to either unnecessary or inadequate N applications, lower returns to the grower resulting in either case.

Despite the fact that most flag leaf N studies have reported total N values at the heading stage, it may be possible to use even earlier flag leaf samples. Time is of the essence. In the case of flag leaf N analysis it takes time for the sample to reach the lab, for the tissue to be analyzed and the result reported. Then, if necessary, the additional late N must be scheduled and applied. Then depending on the sprinkler system it may take some time to get across the field with lines that are moved to incorporate N topdressed.

Ben Simko showed minimal change in flag leaf N between full flag leaf emergence (ligule present) and heading, raising the possibility that flag leaf N at full emergence or even earlier might provide an earlier indication of whether more N is needed for increasing protein. Also, the earlier N is added prior to heading the more effective the N application will be on yield if N is yield limiting.

Few studies have reported flag leaf N values at early flag leaf emergence. From the little information available it appears that flag leaf N will range from .2 to .4% N less at heading than at full flag leaf emergence. If 4.2-4.3% N is the threshold at heading above which the protein increase will be minimal, the threshold for full flag leaf emergence (as identified by the emergence of the ligule) is probably 4.4-4.7% N.

Flag leaf N contents at flowering are considerably lower than they are at heading or full flag leaf emergence. At flowering the N contents may be useful for indicating the N status of the plant, but it's getting late by then to schedule additional N for increasing protein. The N contents could be used to evaluate the effectiveness of earlier applied N. For example, if flag leaf N did not change appreciably from the measurement at full flag leaf emergence or heading, it would suggest that the previous applied N had been effectively used by the plant.

A word of caution might be appropriate here. It is one thing to demonstrate the relation of flag leaf N contents to protein at harvest in small scale research trials. It is quite another to extrapolate the results to commercial fields. Representative samples of flag leaves and harvested grain are easily collected from the research trials. It is much more challenging to collect representative flag leaf samples from commercial scale fields and even more difficult to collect representative grain samples at harvest.

A minimum of 30 and preferably 40 flag leaves should be collected from throughout the field in question. Collecting representative samples is the key to effective use of flag leaf N for predicting protein at harvest and indicating the needs for late season N.

Fall Planted Spring Wheat

I mentioned in the last ***Cereal Sentinel*** that there was some HRS planted in the fall for the 1999 season. There was some winter killed HRS reported, but none was reported by the survey respondents

There were seven HRS fields fall planted among the 32 respondents in the survey. Yields for the fall planted HRS averaged 30 bu/A higher (113 vs 83 bu/A) than for the spring planted HRS. Protein averaged 11.7% for the fall planted HRS and 12.9% for the less productive spring planted HRS.

The fraction of the HRS that was furrow irrigated was similar for both the fall and spring planted HRS (43% vs 44%). There was more early season N provided the fall planted (127 vs 98 lb N/A) than the spring planted HRS, but on a per bushel yield basis the amount was practically the same for fall and spring planted HRS (1.12 vs 1.18). The late season N also was about the same (47 vs 45 lb/A) for both fall and spring planted HRS. So why the apparent protein difference?

More N is required for increasing protein in higher yielding wheat. Increasing protein from 13 to 14% involves a difference of about 22.5 lb/A of protein N in the grain for 120 bu wheat but only 15 lb protein N/A for 80 bu wheat. If you assume the same efficiency in converting late season N to protein N at the two yield levels, then it takes 50% more N to affect the same protein change for 120 bu wheat than it does 80 bu wheat. Current UI recommendations do not reflect this difference. If yields differ by 30 bu/A as they did for the fall and spring planted HRS, then perhaps they should.

Direct Seeding

Direct seeding, reduced tillage, conservation tillage, or no-till of small grains is not widely practiced in western Idaho, at least not with equipment designed specifically for that purpose. Our small grains are seeded generally with double disk opener drills into a variety of conditions, but seldom into previous small grain stubble.

The double disk drills serve us very well in part because there is typically little trash on the surface, following most of our commodities, to interfere with the subsequent small grain seeding. This is generally the case even without the tillage that typically follows the previous crop.

As you probably know from the popular farm press, there is considerable interest in direct seeding now in the

Columbia Basin, Eastern WA, and northern Idaho. The interest is due to several factors, but reducing production costs is probably the most important. Continued low prices for soft white wheat in particular, but all small grains in general, are causing growers to re-evaluate their traditional practices.

There is a wealth of information available on direct seeding of small grains in the PNW. Much of this information is available on the internet from Roger Veseth, Conservation Tillage Specialist. A visit to his website (http://pnwsteep.wsu.edu/) will enter you into the realm of direct seeding. The site is complete with an on-line Conservation Tillage Handbook (hard copies are also available), on farm testing results, a newsletter update, a directory of direct seeding resources, and much more. If you care to read case studies of farms that have tried and converted to direct seeding over a period of time, those are also available.

Low wheat prices are likely to be with us for a while and producers should be examining all possible alternatives for reducing production costs. Direct seeding offers substantial savings in costs. These savngs are documented in Handbook Series #14 of Chapter 10 of the Conservation Tillage Handbook.

Double Cropping for Maximizing P Removal

Manure applied over extended periods in excess of the cropping systems capability to use the phosphorus (P) or potassium (K) has caused a buildup of these nutrients in many fields. Potassium has not accumulate in soils to the same extent as P because it can be taken up by plants at levels several fold higher than is required for growth. This is called luxury consumption. But luxury consumption does not occur with P and it therefore tends to remain in the soil if not removed by cropping.

High available P levels in soils are increasingly considered an environmental contaminant. Runoff from fields with high soil P contribute more P to surface waters. Excessive P in surface waters contributes to the nuisance aquatic growth of algal blooms. The blooms in turn have been implicated in fish kills in Brownley Reservoir.

If soil test P values exceed 40 ppm, levels far in excess of those required for maximum crop yields, current statutes will limit the P applied from any source to the amount that can be taken up into crops. For dairies with limited land resources, limiting the manure application could in effect limit herd size.

Maximizing P removal through cropping either enables more waste derived P to be applied thereby reducing the lands required for manure applications, or with no additional waste applied it reduces excessive soil P levels that constitute an environmental risk.

A double cropping forage system has potential for greatly increasing the P removal with cropping. Harvesting fall planted small grains at the boot stage in May followed by silage corn harvested in late September is being evaluated for its P removal potential at the Parma Reseach and Extension Center. The research is made possible with a grant from the United Dairymen of Idaho.

Results from this double cropping forage system were recently compiled for the first year of this system (Fig. 6). Several fall planted small grains were evaluated including winter wheat, winter triticale, winter barley, spring wheat, and spring triticale. The triticales were the most productive and winter triticale removed the most P among the forages. Spring wheat and winter barley were less productive in part due to winter kill.

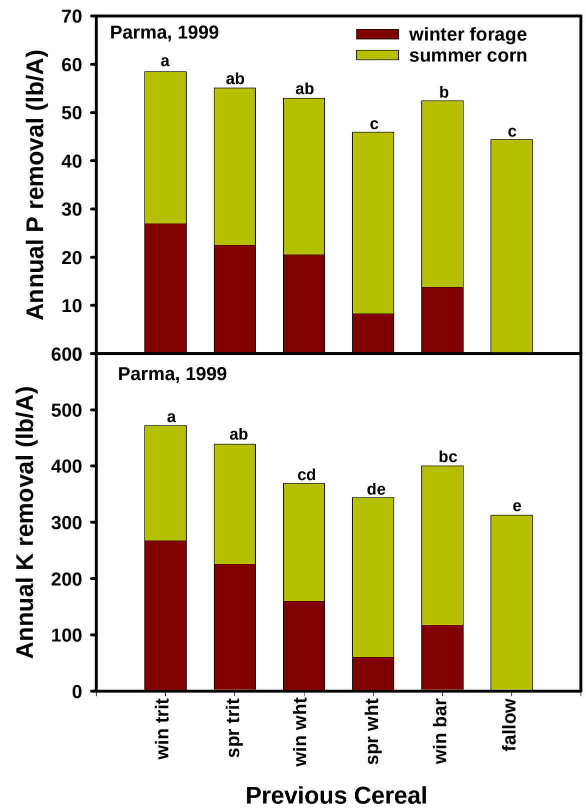

Figure 6. Removal of P and K with a double crop forage system in 1999.

Winter forage seeding rates of 100, 150 and 200 lb/A were also evaluated. The 100 lb rate resulted in less forage production than higher rates for all winter forages except winter barley. The 200 lb rate provided no advantage over the 150 rate. For forage harvested at the boot stage it appears that seeding rates should be higher than for grain.

Corn was no-till planted on May 20 after the harvest of the fall planted forages. Corn stands were poor following the fall planted winter forages except where winter kill had reduced the stand. Corn vigor was also reduced where it followed the more winter tolerant forages due possibly to stubby root nematode. Corn production and P removal with corn was best following plots where no winter forage was grown and least following the winter tolerant forages.

The removal of P from the combined winter and summer grown forages ranged from a low of 45 with spring wheat and corn to a high of 68 lb/A with winter triticale and corn. Corn grown without a previous winter forage removed about 43 lb P/A. More P was removed with the corn than with the winter forages.

Potassium results were similar. As much as 470 lb/A of K were removed with the most productive double crop forage combination of winter triticale and corn.

Despite the problems with corn following fall planted small grains, this double crop forage system increased P removal by 34% and K removal by 54%. Even greater P and K removal can be expected with better corn stands and control of the stubby root nematode.

Past Cereal Sentinels

Several of the previous issues of the ***Cereal Sentinel*** newsletter can be viewed on the Southwest Idaho Extension Cereals Homepage at http://www.uidaho.edu/cereals/SWIdaho.

If you would prefer to read or download this newsletter from the website and receive notice of the new posting notify me at my e-mail address (bradb@uidaho.edu) and leave your e-mail address. The fewer newsletters that we have to print and mail out, the greater the savings.

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