AgriLIFE EXTENSION
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Evaluating Wheat Suffering from Drought and/or Late Emergence

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Wheat throughout the Panhandle is currently in a range of conditions, anywhere from good, to fields that are close to a complete loss. In a few fields wheat was planted but has not yet emerged. Assessing potential yield in early February is never easy. Wheat can look terrible in January thru the first of February and still make a 'decent' yield. Only in the worst of circumstances should a wheat crop be terminated before March 1st. So – what is a decent stand? If we assume that even very late emerging wheat will likely have 3 tillers then a plant population of 10 plants per ft^2 could potentially yield approximately 35 bu/Ac. The following formula can be used to estimate yield based on the number of plants per ft^2:

Plants per sq. ft / 0.2869 = bu/acre

The constant used in this formula makes several assumptions that are discussed in more detail in another publication that can be found at: http://amarillo.tamu.edu/files/2010/11/Wheat-Replanting-Considerations.pdf. Seed number per head and individual seed weight will greatly influence the actual yield. These two components are largely determined by weather conditions in the spring.

If good moisture is received in February and March the wheat crop will most certainly respond favorably. Maximum yield potential may not be attainable, but with the current price of wheat even an average yield could be profitable.

There are three components that contribute to yield. Those are: number of heads, number of seed per head, and weight of each seed. The following is a discussion on the factors that affect these yield components:

1. The number of heads (spikes) is initially determined by seeding rate, percent emergence and tillering. A healthy wheat plant will usually have 3 to 5 tillers (or more under good irrigated conditions) that contribute significantly to yield. The two or three most productive tillers usually develop in the fall. Secondary tillers that develop in late winter and early spring, can, and do contribute to yield. How much they contribute to yield will be associated with the weather in February, March and April.
2. The number of seed per head is largely affected by conditions that are present two weeks prior to jointing, and the conditions that are present during and immediately after flowering. The potential number of seed is determined when the plant switches from a vegetative to a reproductive stage of development. This will likely occur in the Panhandle from March 1st - 15th. The number of potential seed that fully develop will depend largely on environmental conditions at flowering. Moderate temperatures and good soil moisture conditions during flowering will promote greater seed development per spikelet,

resulting in a greater number of seed per head.

3. Seed weight is determined by the conditions present during grain fill. Moderate temperatures, along with adequate moisture and sufficient nutrient availability will promote high seed weight.

Below is a discussion of different scenarios and how these three yield components may interact to effect final yield:

A. ***Fields that emerged well, and got off to a reasonably good start.*** Hopefully these fields still have good yield potential. It is possible some of the primary tillers that developed in the fall may have been aborted due to our fall and winter drought. This situation has likely occurred this year in many dryland fields. Late winter and spring tillers can make up for some of this loss. Conditions that will favor the development of these spring tillers are a cool, wet March. Obviously a wet February would also help. Overall, these fields should have a good chance to make an average to above average yield.

B. ***Fields with wheat that emerged in the fall but are thin and/or spotty***. These are the fields that look like they are just about dead. In this scenario, it is critical that moisture is received in the upcoming weeks. How long these fields will actually hold on is anyone's guess, and will vary from field to field. A wet February, along with a wet and cool March, will be essential for promoting tillering. If adequate tillering does not occur, seed number per head and seed weight can partially offset the lack of productive tillers. However, they are unlikely to fully compensate for the lack of tillering. Expect some decline in yield even under the best spring conditions.

C. ***Fields with wheat that has not yet emerged.*** Even under the best of situations, these fields are unlikely to produce an 'average' yield. However, these fields can still produce significant yield. One common concern is that wheat that has not yet emerged may not have 'vernalized'. Vernalization is essentially a chilling affect that must take place in winter wheat before it will switch from the vegetative to reproductive stage and produce a head. This is a protective mechanism in winter wheat that keeps the growing point below the ground, thus insulating it from potentially being frozen during the winter. Once the plant has been sufficiently 'chilled' and temperatures begin to warm up (day length may also play a role), the plant will start its reproductive stage and jointing will soon occur. This vernalization process starts as soon as the seed imbibes water. Wheat does not need to emerge for vernalization to begin. The effective vernalizing temperature range appears to be from 33° to 50° F. The amount of chilling necessary is variety dependent. Some varieties may require as little as a few days to vernalize, while others may require as much as six weeks. Varieties known to have a short vernalization requirement are TAM 101 and TAM 202. Jagger is also suspected of having a short vernalization requirement. It is likely that any variety planted before January 1st has had plenty of opportunity to vernalize, even if it has just recently emerged. Clearly the yield potential of recently emerged wheat has been significantly reduced due to the lack of tiller development, and even under the best of spring conditions seed number per head and seed weight cannot make up for this. Expect wheat that has emerged after January 1st to have a yield reduction of at least 50% compared to a normal yield.

Estimating Wheat Yield Potential

Two publications have been written on how to estimate wheat yield. Both publications require certain assumptions (guesses) to be made on seed number and seed weight. To get an estimate of yield potential, count the number of plants, or better yet, count the number of tillers, per square foot. By estimating seed number and seed weight a potential yield can be derived. Clearly the closer to actual harvest the more accurate the yield estimate will be. These two publications, one from Texas and one from Oklahoma, can be found online at:

http://amarillo.tamu.edu/files/2010/11/estimating_wheat_yield_potential_1999.pdf
http://amarillo.tamu.edu/files/2010/11/Estimating-wheat-yield-OSU.pdf

Research out of Kansas and elsewhere suggests that wheat yield can be reduced by as much as 20% for every month planting is delayed past its optimum planting date. Late emergence would be the same as late planting. On average, wheat yield was reduced 50% when it emerged in March compared to in the fall. However, as indicated in the previous discussion, actual yield loss will largely be dependent on weather conditions from now through grain fill. If fields have a decent yield potential at the beginning of March, keep in mind that weed control and possibly nitrogen topdressing may be required. If wheat is to be top-dressed with nitrogen this needs to occur before jointing to receive the full benefit of the nitrogen.