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# Spring Nitrogen Management for Winter Wheat

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# Soil Science News & Views



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## Spring Nitrogen Management for Winter Wheat

J. H. Grove

Wheat producers commonly plan their nitrogen fertilizer management during winter months. The crop begins to break dormancy in many parts of the state in late February and early March and soon begins tillering and growing rapidly if nutrition is adequate. Nitrogen is the nutrient most often required and for which annual costs are the greatest for most wheat growers. Consideration of the following basic principles will help wheat producers improve the efficiency and effectiveness of their nitrogen fertilizer dollars.

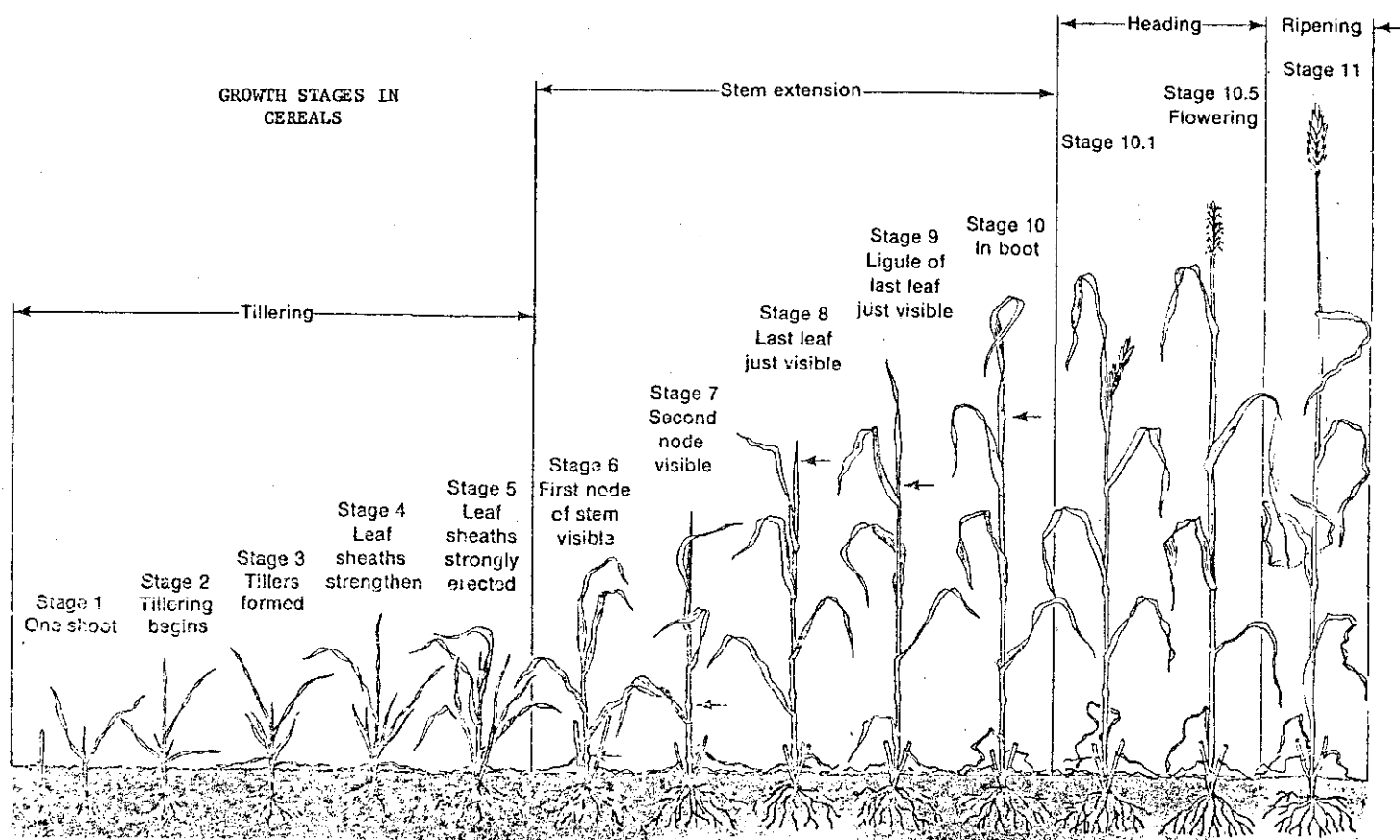
### When to Apply Spring N

The influence of nitrogen on growth, development and yield of winter wheat depends on the rate and timing of N application(s). Nitrogen application during the greenup and early tillering growth period (Feekes stages 2-3) promotes greater numbers of tillers per plant. Application of N at this time to wheat thinned by winterkill may improve yield potential by increased tillering of the remaining plants. On good stands, most wheat is fertilized with N in the mid-tillering growth period (Feekes stages 3-4). If N application is delayed until late tillering-first joint formation (Feekes stages 5-6), larger quantities of nitrogen are available during the stem elongation period (Feekes stages 6-10) when crop height and leaf area for light interception is largely determined. Some European growers apply a portion of the crop's N requirement at flag leaf emergence and/or boot (Feekes stages 9-10) to insure full seed set and larger seed on each tiller. If rainfall becomes limiting and/or air temperatures rise rapidly, as happens on occasion during Kentucky's spring time, these very late applications result mainly in increased grain protein levels instead of increased yield. Abnormally high protein levels tend to adversely affect the baking quality of soft red winter wheat flour.

### How Much N to Apply During the Spring

The effects of N application timing are dependent on the rate of N applied. Too little N results in crop stress and yield reduction. Excessive N availability can result in unnecessary vegetative growth, succulent tissue, thin weak stems, and ultimately, enhanced potential for lodging and disease development on genetically susceptible varieties.

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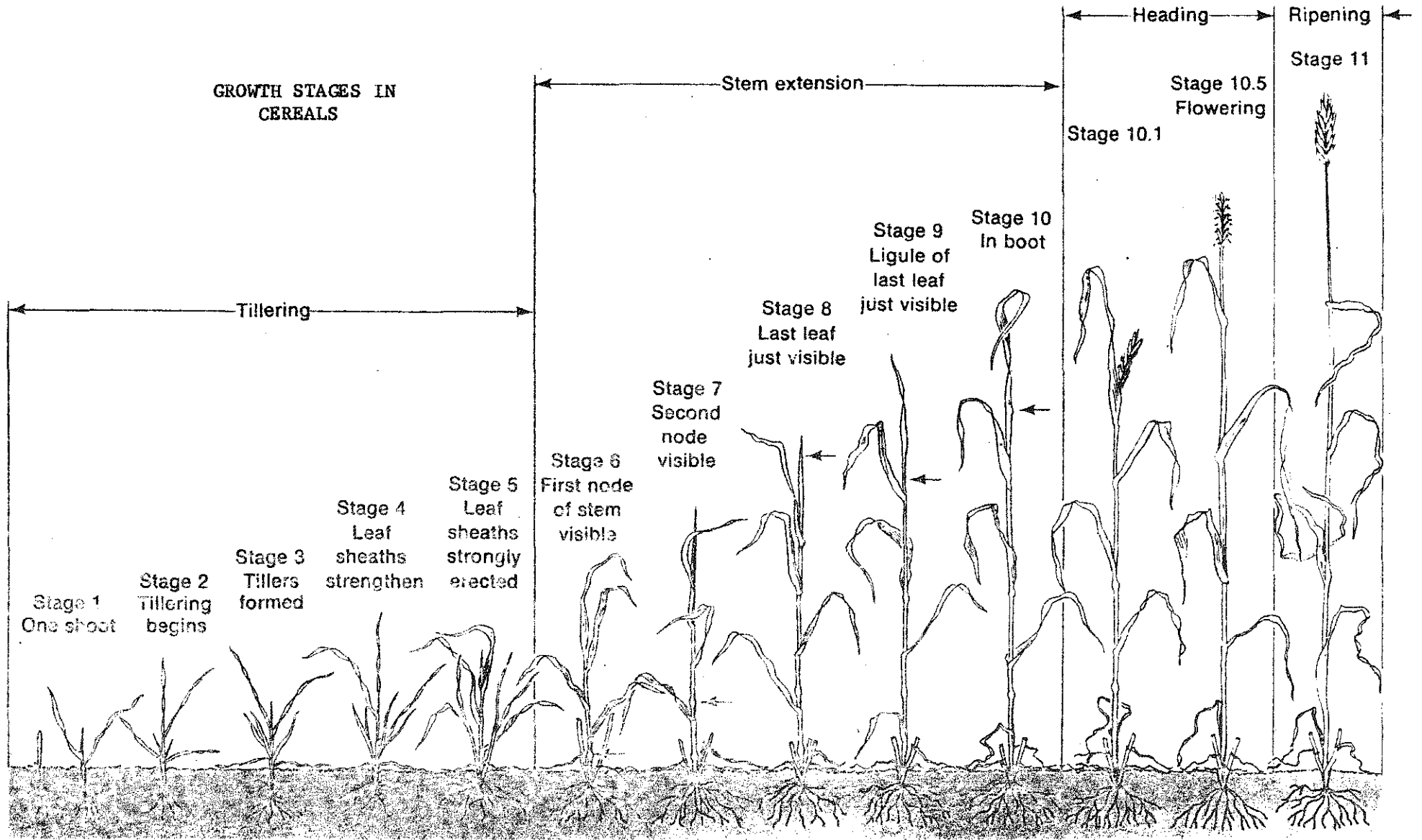
From Large (1954): by courtesy of H.M. Stationery Office, London

#### THE FEEKES SCALE

A 60 bushel per acre crop contains about 80 lb N per acre in grain and straw prior to maturity. Current recommendations call for a total of 60 to 90 lb N per acre from fertilizer. Research by the Agronomy Department at University of Kentucky has rarely shown an economic yield increase to additional N above 90 lb/acre. This research has also shown urea and ammonium nitrate to be of equal value in providing N for nutrition of winter wheat. When combined with the soil N released during wheat growth, the recommended N fertilization level is sufficient for a well managed crop on good soils. No-till wheat producers should use the higher end of the recommended range (75-90 lb N/acre) because surface residues increase the potential for denitrification and immobilization losses of fertilizer N. Use of manures can reduce the amount of commercial N required. The publication, "Lime and Fertilizer Recommendations" (AGR-1), contains estimates of the N value of various types of manures. This is available at County Extension offices.

Producers who use more than 90 lb N/acre in aiming for higher yields (80+ bu/acre) on their very best soils should split their nitrogen applications between early to mid tillering (Feeke's stages 3-4) and early stem elongation (Feeke's stage 6). Thirty to forty percent of the total N would be applied at the first application; the rest at the second. Although splitting the N application should reduce crop stress potential in such situations, producers should be ready to use appropriate disease control methods if the need arises. Use of plant growth regulators, which are not yet cleared for commercial use on wheat, offer future promise in reducing wheat lodging potential.

**GROWTH STAGES IN CEREALS**



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**THE FEEKES SCALE**

