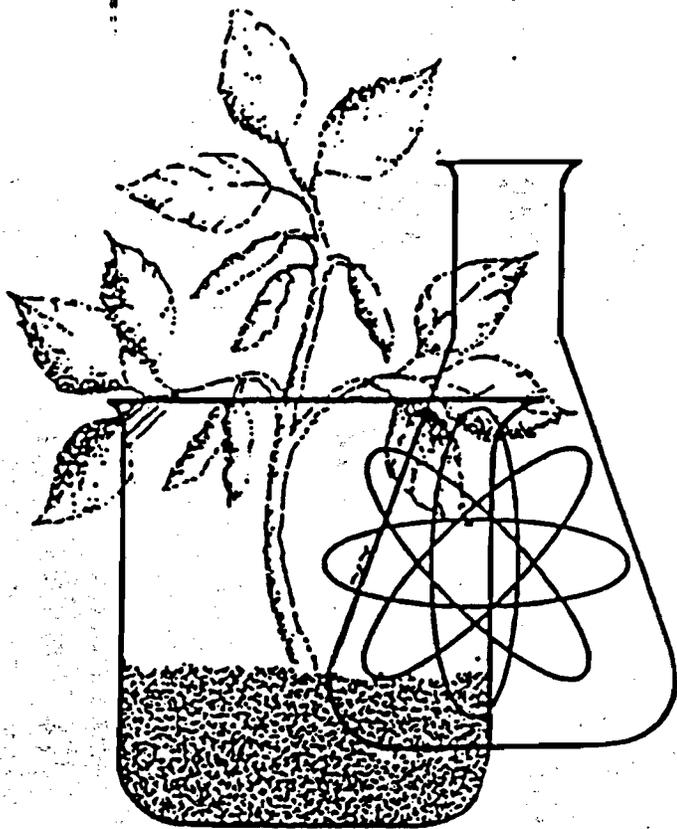
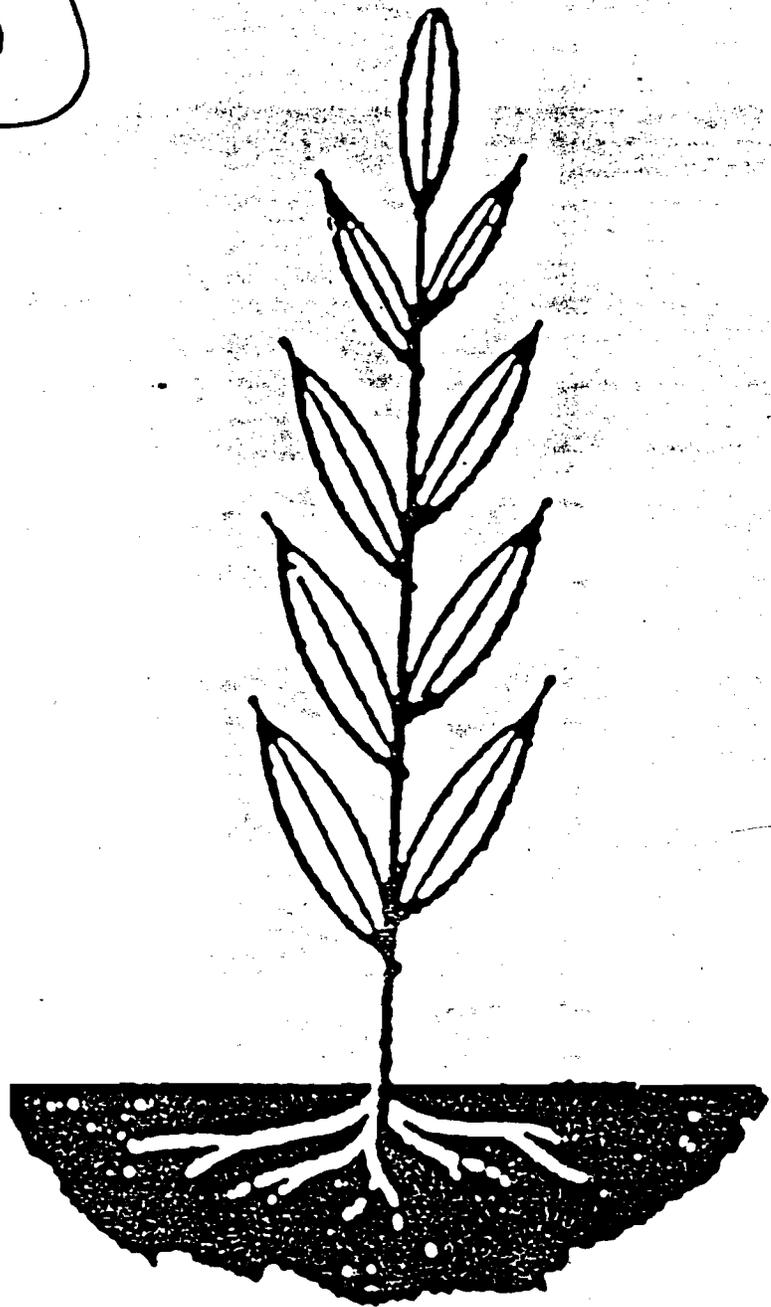


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## SOIL FERTILITY RESEARCH IN NO-TILL FARMING SYSTEMS

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### SUMMARY

The purpose here is to briefly outline the soil fertility research being conducted at the Central Great Plains Research Station. Field work on a couple of research projects have recently been completed. The residual effects of broadcast P fertilizer on irrigated no-till winter wheat yield and quality was examined in one of these studies. The results showed that irrigated winter wheat responded positively to a single P application for at least 3 years on a soil testing low in available P. Application of P resulted in more efficient use of N fertilizer by winter wheat and significantly reduced residual soil  $\text{NO}_3\text{-N}$  levels.

The second study completed this fall involved the effects of date and rate of N application on no-till winter wheat yields. Preliminary analyses of the data indicate that anhydrous ammonia can be applied any time during the fallow period from May to September without any detrimental effects on grain yield. Application of ammonium nitrate topdressed to winter wheat in March was also as effective. Date of application had little affect on rate of N needed to optimize grain yields.

The effects of N source, placement, and rate on dryland no-till winter wheat yields is also being studied. Ammonium nitrate, urea, urea-ammonium nitrate (UAN), and anhydrous ammonia are the N sources. Placement methods include broadcast, dribble over seed row, and band below seed for all sources except anhydrous ammonia which can only be banded. Preliminary results indicate that ammonium nitrate is the most efficient source of N with N placement method having little effect on grain yield. Application of more than 50 lb N/a as anhydrous ammonia at about 3 inches below the seed at planting appears to have a detrimental effect on grain yield and plant stands. A third year of data will be collected in 1988.

The management of P fertilizer for dryland winter wheat grown in reduced tillage systems is also being studied on a loam soil with a medium P soil test. Single applications of P were applied broadcast with and without incorporation and banded 3" below seed at rates of 0, 30, 60, 90, and 120 lb P/a. Fertilizer P was also applied directly with the seed at rates of 0, 7.5, 15, 22.5, and 30 lb P/a. The P placed directly with the seed will be applied to each of 4 successive crops. Data from the 1st year of P application indicate that grain yields increased with P applic-

ations up to 90 lb P/a when the P was broadcast incorporated and banded below the seed, with 120 lb P/a being needed to maximize yields when P was broadcast without incorporation. Placing the P directly with the seed at 25% of the other P rates resulted in significantly lower yields. The data indicate that higher rates of P than those being recommended may be needed to minimize P deficiency in no-till winter wheat in the Central Great Plains.

Several studies have been initiated to evaluate the N needs of more intensive crop management systems for more efficient utilization of water supplies. Cropping systems being evaluated are a winter wheat-corn (or sorghum)-fallow rotation; a continuous winter wheat-barley rotation; and a continuous barley (winter wheat)-corn rotation. Results indicate that N application significantly increases crop yields and water-use efficiency in each cropping system. Nitrogen fertilization is essential if economical yield levels are to be obtained with these more intensive cropping systems in the Central Great Plains. Dryland corn yields as high as 98 bu/a have been achieved following barley or winter wheat with application of adequate N.