CROP DEVELOPMENT STUDY, 1988

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The crop development study is a continuing study on the effects of crop rotation on the development of yield components of wheat. The measurements that we are taking include: soil water content at weekly intervals, leaf water content twice weekly, development of the main stem and tillers and harvest analysis.

The year of 1988 was more severe than any to date in this study. First of all, there was less stored available water on stubble ground than ever before in this study. There was only about one inch of available water after sunflowers, whereas the previous range was from 2-6 inches. Stand establishement was better than expected, owing to an early rain that was not received in other areas of the state. Stored water after fallow was about 7 inches, which is normal.

Tillering was inhibited by the severe heat (Table 1). This is the first time in the course of this study that heat stress was so severe so early that tillering was influenced. Usually heat and drought stress alters the survival of tillers, but seldom is stress present so early as to alter the initiation of the tillers. Normal tillering patterns would be 40-90% of plants with a T1 tiller, > 90% with a T2 tiller, and 10-50% with a T3 tiller. Obviously both the recrop and fallow were suffering greatly.

Soil water content (Figure 8) showed the low amount of water present in the recrop ground all year. More importantly, the fallow never did exhaust the stores of available water. The heat stress was so severe even on fallow ground that the plants apparently failed to set normal rooting systems. Leaf water content (RWC) is shown in Figure 7. RWC values of 90-100% indicate no water stress, values of 80-90% indicate a moderate stress, and values less than 70% indicate a very severe stress. It is obvious that the recrop wheat was under severe stress all season. Even on fallow, suffered from at least moderate stress all season even with stores of "available" water left in the profile.

The recrop wheat was a total failure, yielding less than 1 bu/A. The fallow wheat was a practical failure, yielding about 6 bu/A. The lesson of this year is pretty obvious. Even though one can have a full profile of stored water at the beginning of the season, a good variety, a good stand, and good herbicides at one's disposal, one is still at the mercy of Nature.

Table 1. Tillering Patterns, 1989

Crop Rotation	Percent of Plants with a Normal T1	T2	T3	Tiller per Plant
Recrop+	12	10	5	0.3
Fallow	40	42	12	0.9

+ Recrop = wheat after sunflower, fallow = wheat after cultivated fallow.

Figure 1. Relative water content index of drought stress in spring wheat, 1985.

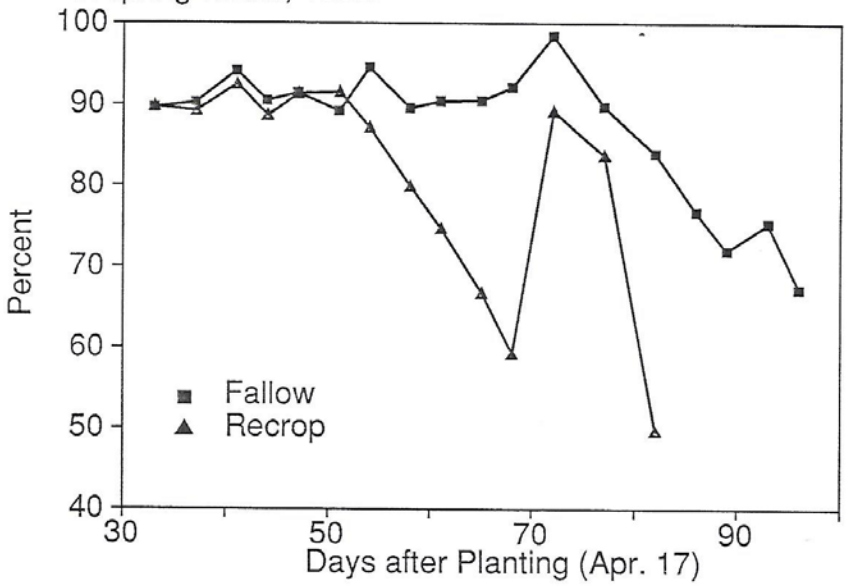

Figure 2. Total water in 1.2 meters (4 ft.) of soil, 1985.

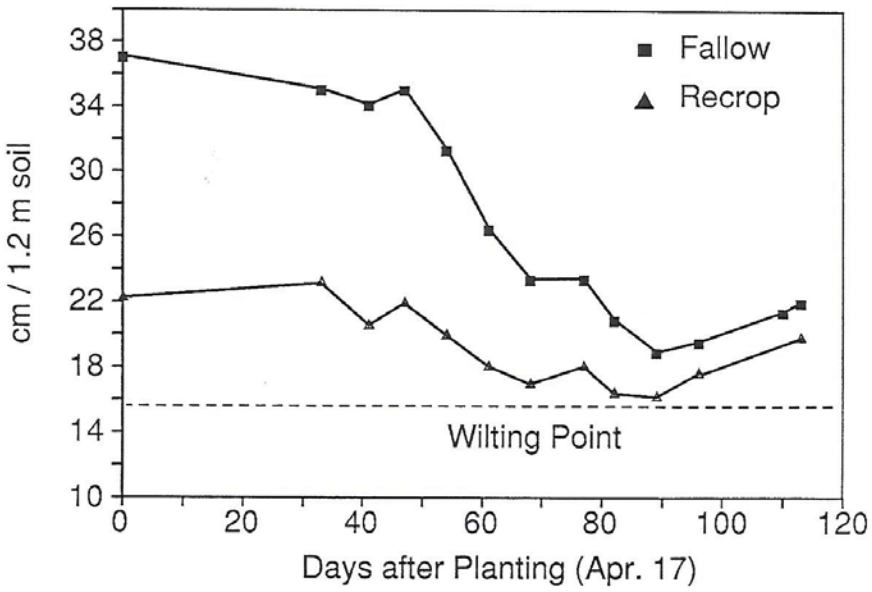

Figure 3. Relative water content index of drought stress in spring wheat, 1986.

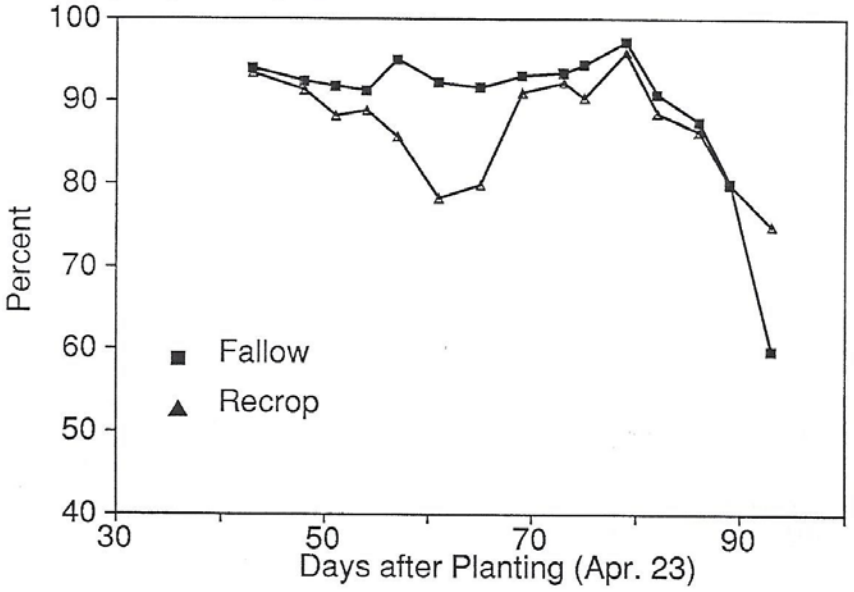

Figure 4. Total water in 1.2 meters (4 ft.) of soil, 1986.

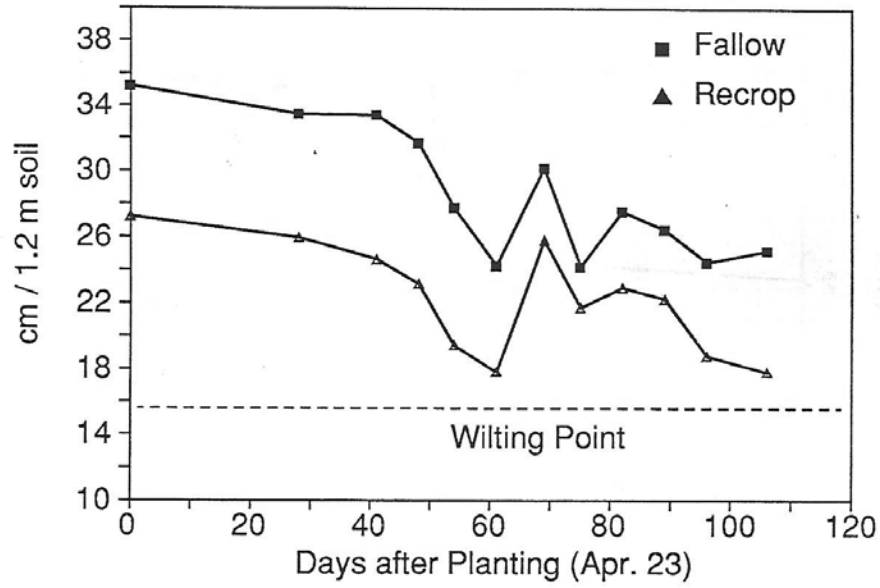

Figure 5. Relative water content index of drougth stress in spring wheat, 1987.

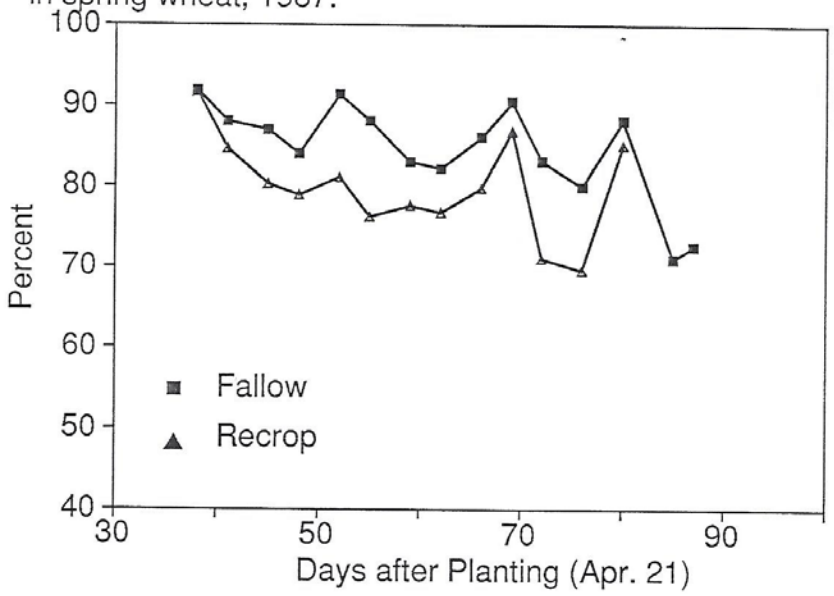

Figure 6. Total water in 1.2 meters (4 ft.) of soil, 1987.

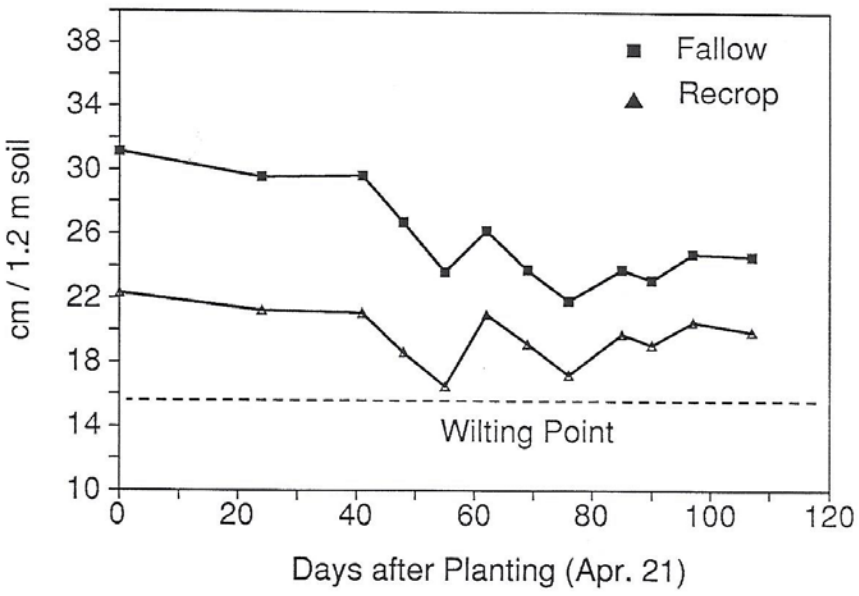

Figure 7. Relative water content index of drought stress in spring wheat, 1988.

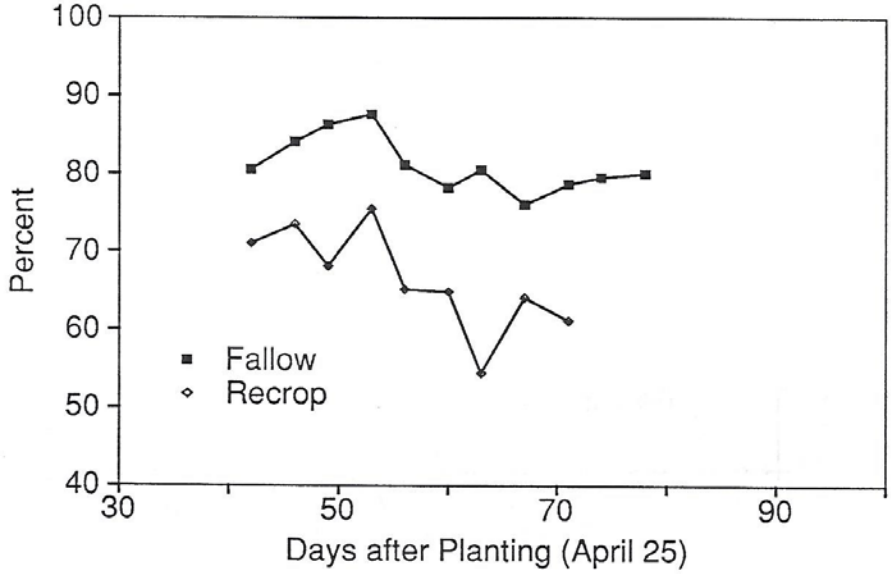

Figure 8. Total water in 1.2 meters (4 ft.) of soil, 1988.

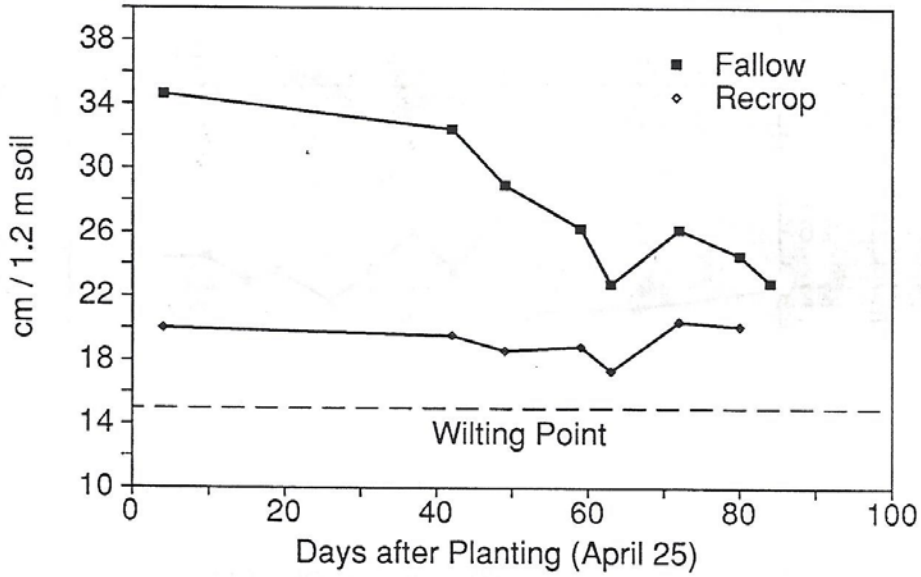

Figure 9. Major components of spring wheat yield, 1985.

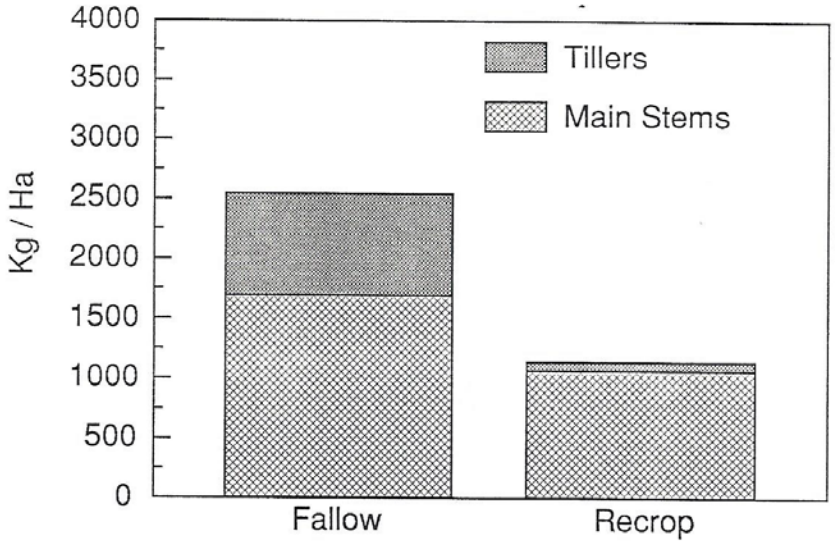

Figure 10. Major components of spring wheat yield, 1986.

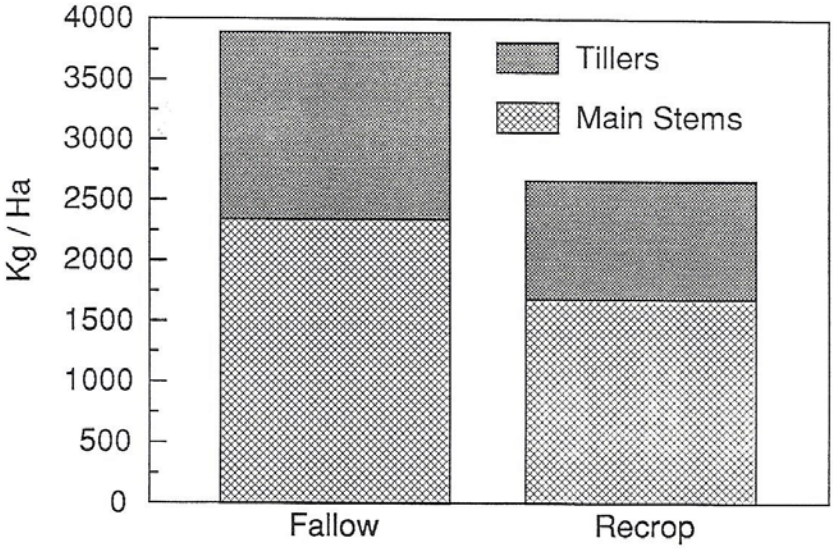

Figure 11. Major components of spring wheat yield, 1987.

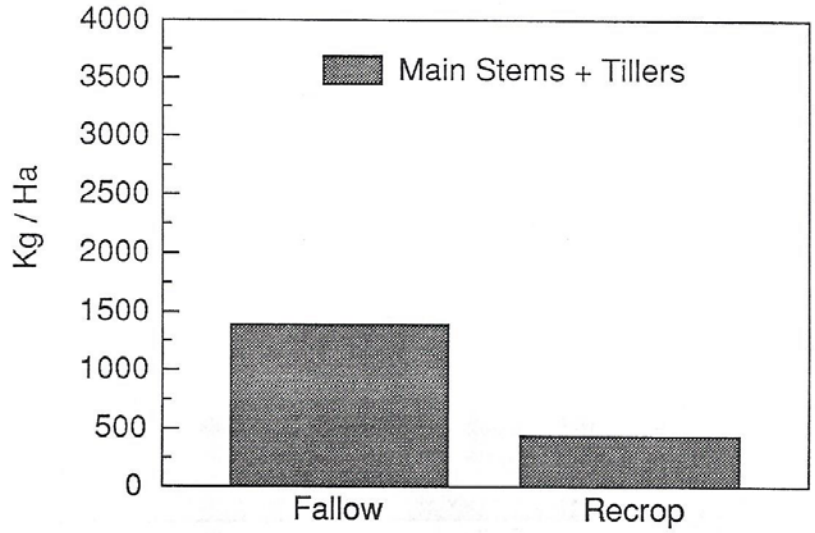

Figure 12. Major components of spring wheat yield, 1988.