

Response of cereals to fertilizer N on pulse and other stubbles

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Yield and protein of cereal grain are often higher when grown on the stubble of pulse crops compared with other stubbles. Frequently, this pulse benefit is attributed to additional N mineralized from pulse crop residues that become available to the subsequent cereal. Hence, is it profitable to reduce N fertilizer for cereals grown on pulse stubble compared with other stubbles? To address this question hard red spring wheat, durum wheat, CPS wheat, and barley were grown on various crops stubbles including pea, lentil, dry bean or kabuli chickpea, mustard, and a cereal (durum or barley) at three location in SK: Swift Current (1998-2002), Redvers (2001-02) and Canora (1999 and 2002). N rates were those based on recommended rates based on fall soil nitrate (generally about 50 kg/ha), 15-30 kg ha less than recommended for below normal rainfall conditions, and 15-30 kg ha more than recommended for above normal rainfall conditions. There was a significant effect of stubble on subsequent cereal grain yield with an overall ranking of pea \geq lentil \geq mustard \geq cereal stubble. The cereal yield on pea stubble averaged 10-20% higher than on cereal stubble. The cereal yield on dry bean/chickpea stubble was variable: sometimes as high as on other pulse stubbles and sometimes equal or lower than on cereal stubble. The responses of the different cereals to stubble type were similar. Within this narrow range of fertilizer N, yield response to N was non-significant in some site-yr. In those site-yr with significant response to N, the increase in yield with increases in fertilizer N were similar among stubble. The effects of stubble and N fertilizer on the cereal grain N yield were similar to those of grain yield. The effects of stubble and N fertilizer on cereal grain protein concentration were more complex because of yield dilution effects. For a given N fertilizer rate, grain protein concentration was generally higher on pulse stubble than other stubbles. Within pulse stubbles, the trend was for highest grain N concentration on lentil stubble. The results show that the effects of pulses on the subsequent crop is not fully explained by increased N availability. Based on these results, it would not be profitable to use lower N fertilizer for pulse stubbles relative to other stubbles. In fact, for hard red spring wheat and durum meeting grades having protein premiums, it was economically advantageous to use higher fertilizer N rates on pulse stubbles than on other stubbles. The latter was because there was a greater chance of attaining grain protein concentrations in the range of premiums with increasing fertilizer N on pulse stubbles than on other stubbles.