

# Effects of Integrated Crop Management Practices on the Agronomic and Economic Performance of Cropping Systems in the Dark Brown Soil Zone of Saskatchewan

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## Abstract

Changes in tillage intensity and herbicide application frequency can influence weed community dynamics, crop yields, and economic returns. Our objective was to determine the effects of six integrated weed management methods (with varying combinations of tillage intensity, seeding rate, fall weed control, preseeding weed control, in-crop herbicide use, and seeding date) on grain yields and quality, weed community dynamics, and economic returns for a 4-year wheat-canola-barley-pea rotation in the Dark Brown soil zone of Saskatchewan, and to measure the impact of annual fungicide applications on the yield and economic performance of the four crops. After 4 years we found that residual weed populations increased as the level of herbicide application decreased. Summer annual weed species tended to be associated with low herbicide and high tillage, while winter annual and perennial weeds were associated with low herbicide and zero tillage. Zero tillage systems produced higher yields and yields generally declined as the intensity of tillage increased. For all crops, the high herbicide-zero tillage system produced the highest yields whereas the lowest yields were observed in the no herbicide-high tillage system. Weed management system had minimal impacts on seed quality. The blanket application of fungicide generally increased yield of barley, wheat and pea but the enhanced yields were not adequate to recover the costs of the fungicide and its application. High herbicide-zero tillage, medium herbicide-zero tillage, and low herbicide-zero tillage produced the highest net return, while no herbicide-high tillage produced the lowest net return under all grain price scenarios. The lower net return with the no herbicide-high tillage system, and to a lesser extent, the low herbicide-low tillage system, reflect in part the difficulty of adequately controlling weeds when relying primarily on tillage alone.