

CROP ROTATION

Rotation still has a big influence on yield

Manitoba crop insurance data show clear differences when it comes to crop rotation choices for canola and wheat

BY DOUG WILCOX

Crop rotation influences crop performance. The most likely causes of this "rotation effect" are impacts on soil moisture and fertility; build up of diseases, insects, toxic compounds and weeds; soil erosion; pesticide rotation; economic risk spread; and workload balance. However, in recent years technological innovations in agriculture and economic pressures have challenged the need to be concerned with rotation effect. But Manitoba Agricultural Services Corporation (MASC) analyzed its database of producer records show that this effect is still strong.

MASC offers production insurance in Manitoba and it collects information from its clients on what crops are planted on each field and the crops' yields. Annual crops enrolled in production insurance in Manitoba account for over 85 per cent of cropped acres in the province, making the MASC client records database a very representative and useful reference for studying field scale agricultural practices. MASC has recently used these records to determine the average yields of red spring wheat and canola crops planted on various stubble types at planting. A summary of this analysis is graphed in Figure 1 (red spring wheat) and Figure 2 (canola). These graphs summarize the yield data reported to MASC for the 10-year period of 1997 to 2006, from fields 120 acres in size or larger throughout Manitoba. Only rotations that had 10 years of experience are presented. Analysis was limited to larger fields

because MASC does not track field positions within quarter sections.

Over the period analyzed, red spring wheat most often went into canola stubble (51 per cent). Next was red spring on red spring (15 per cent), and then red spring on flax (eight per cent). The top three stubble types for canola were red spring wheat (54 per cent of acres), barley (14 per cent) and flax (three per cent). Canola planted on canola stubble occurred on three per cent of the acres over the period of study.

ROTATION HAS A BIG INFLUENCE ON YIELDS

During the period studied, the difference in average yield between the best and worst stubble was 24 bushels per acre for red spring wheat and 10 bushels per acre for canola. For both wheat and canola, the same four types of stubble at planting resulted in the highest yields. These stubble types were white pea beans, potatoes, fababeans and grain corn. Although the basis of the rotational yield benefit observed has not been studied, all four crops are generally known for leaving high residual fertility in their stubble for subsequent crops.

MASC records indicate the yield of red spring wheat planted on white pea bean stubble was on average 36 per cent higher than red spring wheat planted on red spring wheat stubble. Similarly, the yield of canola planted on white pea bean stubble was on average 38 per cent higher than canola planted on canola stubble. Additionally,

MASC records show an expected trend that indicates rotating cereals with broad-leaved crops generally leads to higher yields.

At the other extreme, the stubble that resulted in the lowest yields for both canola and wheat was fall rye. Although the basis of the rotational yield loss observed has not been studied, the straw from fall rye is notorious for tying up soil nitrate-nitrogen, potentially leaving it unavailable for subsequent crops. MASC records indicate that the yield of red spring wheat planted on fall rye stubble was on average 29 per cent lower than red spring wheat planted on red spring wheat stubble. The yield of canola planted on fall rye stubble was on average two per cent lower than canola planted on canola stubble.

In annual crop rotations, it is usually recommended that growers avoid planting fields with the same crop two or more years in a row. MASC records illustrate the value of this recommendation. It was determined over the study period that when red spring wheat was planted on red spring wheat stubble, the average yield was 90 per cent of the provincial average yield. Similarly when canola was planted on canola stubble, the average yield was 83 per cent of the provincial average yield.

Analysis of the MASC records also revealed that yields of red spring wheat and canola planted on alfalfa hay stubble and on fallow land was below average. Perhaps this finding shouldn't be a surprise. Although the basis

of this rotational yield loss observed has not been studied, it is known that after working up an alfalfa stand, considerable time should be allowed for a partial fallow to kill the plants, decompose the sod and replenish the soil moisture reserves for the succeeding crop. Additionally, summerfallow is known to store only a portion of the precipitation that falls on it. Usually it is unfertilized and can also cause soil degradation.

MASC records demonstrate that for red spring wheat and canola, the rotation effect still exists today and despite current technological advances is worth consideration in modern crop planning. A good crop rotation is not based solely in terms of individual crop yield but should be based on proactive development of an optimized system for the long-term that makes economic and agronomic sense. After all, there is only a limited amount of white pea bean stubble fields available for planting.

Hopefully this analysis of MASC records will help you in planning which of your available stubble options are optimal for planting canola and red spring wheat. Maximum rotation effect benefits will only be achieved if growers take a proactive effort to plan rotations, instead of simply reacting to immediate problem field histories or current commodity prices.

Doug Wilcox is the manager of insurance program development with Manitoba Agricultural Services Corporation in Portage La Prairie.

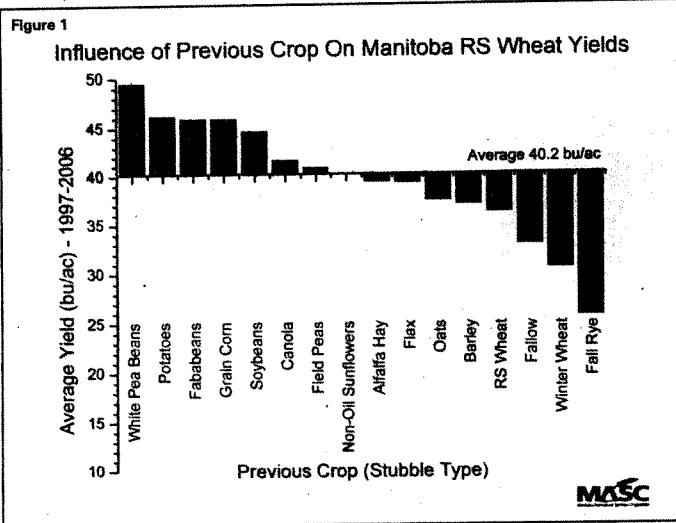


Figure 1 shows a 24 bushel-per-acre yield difference for red spring wheat planted into white pea bean (navy bean) stubble versus red spring wheat planted into fall rye stubble.

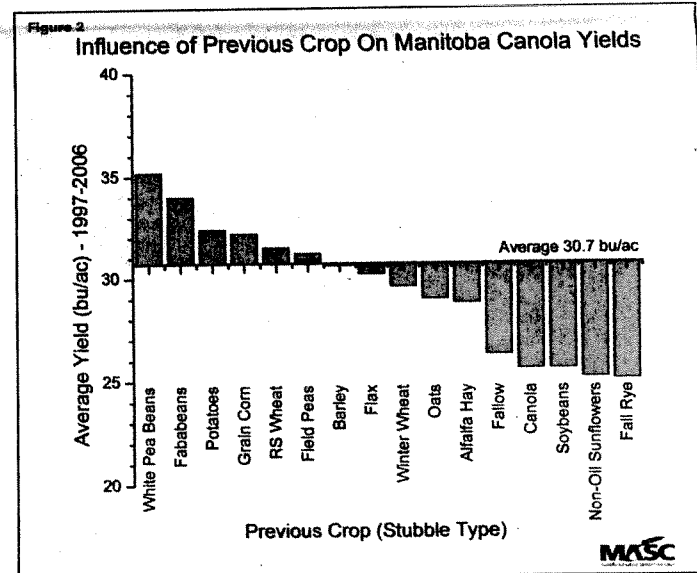


Figure 2. Manitoba production insurance data for the past 10 years shows that canola planted into white pea bean (navy bean) stubble yielded 10 bushels per acre higher than canola planted into fall rye stubble. Canola on wheat yielded about six bushels higher than canola on canola.