Growing Safflower Can Increase Yield of the following Barley Crop

In dry Mediterranean areas, barley is the traditional and predominant feed for sheep. As sheep number has rapidly increased, the accompanied increase in feed demand has led many farmers to grow barley continuously, which unfortunately, is not a sustainable cropping system.

Safflower, which is mainly an oilseed crop that originated in the eastern Mediterranean region, is relatively drought tolerant. Although safflower could be rotated with barley, the fact that the crop has deep roots has raised concerns that it may exhaust water reserves in the soil and thus deleteriously affect the following crop (Pala and Beg, 1997). In following years, conflicting findings on the effects of safflower on subsequent crops have been reported outside the region.

To evaluate the effect of safflower on the yield of the following barley crop and to compare the safflower effect with other crops under Mediterranean conditions, a team of researchers from the American University of Beirut and ICARDA (The International Center for Agricultural Research in the Dry Areas) conducted collaboratively two series of experiments under rainfed conditions in Lebanon’s Bekaa Valley. In Series 1, there were 12 two-year rotation systems, whereas in Series 2, three rotation systems were studied. Results from the studies are reported in the November–December 2012 issue of *Agronomy Journal*.

Rotation effects were significant ($P ≤ 0.05$) for barley grain yield, straw yield, and harvest index, but the rotation × year interaction was not significant. In Series 1, barley after safflower gave the highest harvest index (0.40 kg kg$^{-1}$) and mean grain yield (1,400 kg ha$^{-1}$), that is, 28 to 72% higher grain yield than after the other crops, except after cumin and common vetch for grazing. In Series 2, grain yield and harvest index of barley after safflower (4,090 kg ha$^{-1}$ and 0.36 kg kg$^{-1}$) were higher than that after barley (3,010 kg ha$^{-1}$ and 0.32 kg kg$^{-1}$).

The positive finding of the barley–safflower rotation in this study can allay concerns among farmers regarding reduced cereal grain yields following the deep-rooted safflower crop. The authors note that not only can rotating barley with safflower increase barley yields in years with average or above-average rainfall relative to barley monoculture, it was shown to increase barley yield in the year with below-average rainfall as well. In dry years, when water is mainly stored in the subsoil, safflower may have a beneficial effect to the subsequent barley crop by providing biopores for deeper barley root extension. The finding that the increase in barley grain yield was associated with enhanced harvest index but not with straw yield tends to support this line of reasoning. Future research is needed to confirm whether the proposed explanation is correct or not.

Since growing safflower before barley increased rather than decreased barley yields, and was comparable to or better than yields following some legumes, the authors conclude that barley–safflower appears to be a viable rotation to replace barley monoculture in semiarid, rainfed Mediterranean areas. A re-introduction of safflower may increase the diversity and sustainability of the cropping system in the region, they say.

Reference
