CropLife Foundation
Crop Protection Research Institute

Europe's Wheat Yields are the World's Highest Due to Fungicide Use

International Pesticide Benefits Case Study No. 43, December 2011

Leonard Gianessi and Ashley Williams

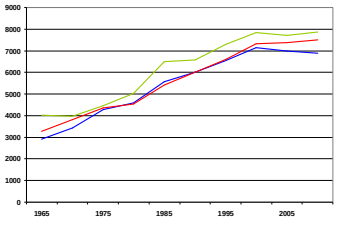
In the EU, where relatively high levels of subsidy support are available, wheat crops are cultivated in an intensive manner where control of diseases is of paramount importance with yields averaging 6 t/ha, almost 60% higher than the world average. In other areas of the world, lower wheat yields reflect the lower level of inputs. In Europe, 11% of the world cereal production comes from only 6% of the world's cereal acreage, indicating a highly intensive cultivation. Europe accounts for about 80% of the worldwide cereal fungicide market.

Septoria tritici blotch (STB) of wheat with symptoms decreasing from left to right

Until the mid 1960s, fungicide use on wheat in Europe was only exceptional. However, during the 1960s there was a growing body of evidence that diseases of wheat were causing more losses than had previously been acknowledged [3]. At the end of the 1960s the first foliar fungicides to be targeted specifically at cereal diseases were introduced. Midway through the 1970s, new fungicides were developed that significantly broadened the number of diseases that were effectively controlled [3]. Use of foliar fungicides gradually increased until in 1979 about 26% of the cereal hectares in western Europe received at least one treatment and 50% were treated in the UK [4]. Since the 1990s, more than 95% of wheat acres in the UK, France, Germany, Denmark, Belgium, and The Netherlands have been treated with fungicides [2]. Fungicide use has been one of the major factors accounting for the increase in European wheat yields since the 1970s.

Wheat field being assessed for infection by STB

Fungicides contribute substantially to the yield of wheat in Europe. Average responses to treatment usually range between 0.5t/ha and 2.5t/ha though where *Septoria tritici* blotch (STB) pressure is particularly high, yield responses of 5t/ha are sometimes seen. As STB is favored by rainfall, the higher rainfall regions in the west of Europe, such as the UK and France, usually have higher yield responses to fungicides than Denmark and Sweden [1]. A recent study estimated wheat production losses, assuming no use of fungicides, would be 20% in the UK, 26% in France and 70% in Denmark [1]. In all countries, STB was the disease that caused the greatest losses without fungicides.



European wheat yields, 5 year average (Kg/Ha): France (blue), Germany (red), UK (lime)

There is limited scope to control the major diseases of wheat without fungicides. Changing sowing date has a relatively small effect on the severity of STB, unless sowing is delayed until the spring (thus avoiding much of the spore dispersal that initiates crop infection). However, spring cropping would substantially reduce yield, compared with the predominant current practice of sowing in September and October [1]. There is little economic incentive for farmers to grow disease-resistant but lower yielding varieties as the additional cost of fungicides on disease-prone varieties is more than offset by higher yields.

References

1. Blake, J., S. Wynn, C. Maumene and L.N. Jørgensen. 2011. Evaluation of the benefits provided by the azole class of compounds in wheat, and the effect of losing all azoles on wheat and potato production in Denmark, France and the UK. ADAS. 30 September.
2. Jørgensen, L.N., G.C. Nielsen, J.E. Ørum and E. Noe. 2008. Controlling cereal disease with reduced agrochemical inputs - a challenge for both growers and advisers. *Cereal Pathosystems.* BSPP Presidential Conference. University of London, 16-17 December.
3. Lawrence, N.J. and J. Appel. 1997. Cereal fungicides - past, present and future. *Aspects of Applied Biology*. 50:263.
4. Jenkins, J.E.E. and L. Lescar. 1980. Use of foliar fungicides on cereals in Western Europe. *Plant Disease*. November: 987.

CropLife Foundation
1156 15th Street, NW #400 Washington, DC 20005
Phone 202-296-1585 www.croplifefoundation.org Fax 202-463-0474