

Herbicides are Key for Wheat Farming in Australia

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The wheat growing belt of Australia extends over the southern half of a continent 3000 miles across. Most of the area lies in the winter rainfall zone and crops are dependent on autumn and winter rains. Australian wheat yields have increased by an average of 12–13 kg/ha/yr since the 1930s despite rainfall not changing. Since the early 1980s there has been a more rapid increase in yield of over 30 kg/ha/yr (Figure 1) [4]. The adoption of herbicides accompanied by reductions in tillage has been a key factor in improving rainfall-use efficiency and increased wheat yields [4].

Prior to the 1940s weeds were controlled almost solely by cultivations, mainly in a fallow period [1]. Sowing of wheat was delayed to permit additional cultivations. Such approaches incurred significant yield loss from delayed sowing and the loss of soil moisture through evaporation [2]. Between the onset of opening rains and planting, as many as 4 tillage operations to control weeds were needed, resulting in a planting delay of 28–42 days [2]. Yield losses of up to 3 bu/a, or 200 kg/ha, for each week's delay have been demonstrated.

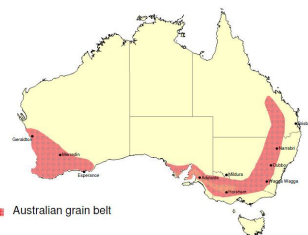
The introduction of 2,4-D and MCPA in the 1940s provided an economical method of selectively controlling broadleaf weeds in cereal crops. By 1970 chemical weed control was used on 10-20% of the wheat crop [1]. A significant increase in herbicide use in the 1970s resulted from the introduction of preemergence soil-incorporated products for controlling grassy weed species. The development of postemergence herbicides to control grassy weeds without the need for soil incorporation and the introduction of knockdown pre-plant herbicides were the keys to the development of reduced tillage systems. By 1981 herbicides were being used on 60% of the wheat acres [3].

Australian grain growers have been reducing their use of cultivation since the 1970s with 44% of the nation's crop in no-till by 2001[6]. The falling price of the predominant knockdown herbicide, glyphosate, had a significantly positive effect on the adoption of no-till with 78% of the farmers practicing no-till in 2008 [7]. The use of no-till means that the seed is sown with minimum soil disturbance, reducing evaporation and increasing yields. In addition, no-till systems allow for earlier planting [4]. Research demonstrated that using herbicides instead of tillage resulted in 27 mm of extra water in the soil profile and an increase in grain yields of 15–25% [8].

The Australian grains industry relies on herbicides for weed control, spending nearly \$1 billion on them annually [5]. The majority of wheat growers regularly use knockdown herbicides (76–93%) and post-emergence herbicides (69–88%) [9].

References

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Tillage



Right plot: Herbicide treated; Left plot: Untreated

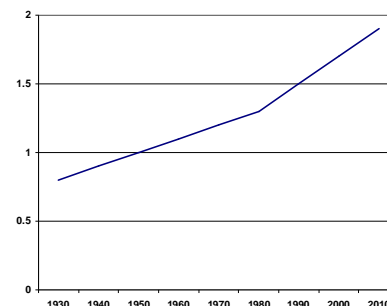


Figure 1: Australian Wheat Yield, T/Ha (Trend Line)