indicate insignificant yield depressions at sowing rates up to 134 kg/ha. These results also support the hypothesis of Godel (1935) that higher populations of wheat smother weed growth.

The practical application of this data is not easy and there are many crop/weed situations in which the economic threshold level of weed infestation should be determined. The problem is to obtain values which take account of the many variables.

THE EFFECT OF GROWTH HABIT ON THE COMPETITION BETWEEN WHEAT AND ANNUAL RYEGRASS

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INTRODUCTION

Theoretically, crops with short, erect leaves have some advantages over crops with long, slack leaves. Angus, Jones and Wilson (1972) reported that these advantages included better penetration of sunlight and consequently light distribution. However in practice a number of limiting factors could prevent erect-leaf varieties from exhibiting their potential. Weeds may selectively depress an erect-leaf crop because of the better light supply to the weed leaves.

Similarly, it is also possible that weeds could be more damaging in shorter crops due to increased light competition. As Australian wheat breeders have been selecting for short straw for many years, some new wheat varieties are semi-dwarf, that is around two thirds the height of the older varieties (Fisher and Martin 1974). Visually weeds, particularly annual ryegrass (*Lolium rigidum*), appear to have more damaging effects on these shorter varieties than on taller varieties. If this is the case, the superior yields of semi-dwarf varieties exhibited under weed-free conditions could well be nullified in weedy environments.

In an experiment conducted at Rutherglen in 1973, four wheat varieties of differing growth habit, Olympic, Sherpa, Z3-2-4 and Z3-3-1-8, were each sown with various densities of annual ryegrass in order to investigate effects of competition.

RESULTS

Wheat densities did not differ significantly between varieties or treatments and the mean population was 158.4 plants/m^2.

The presence of ryegrass significantly reduced ($p < 0.05$) wheat dry matter production by early jointing and these differences were carried through to anthesis. Similar reductions occurred with all four varieties.

The reductions in wheat dry matter production were at least partly due to reduction in the number of fertile tillers by ryegrass infested wheat. Tiller numbers were markedly lower at the highest ryegrass density (700 plants/m^2) than on the weed-free treatments ($p < 0.05$). There were no varietal differences. Likewise, whilst the presence of ryegrass markedly reduced wheat grain yields, the percentage reductions in yield were similar for all varieties (41% reduction at 700 ryegrass plants/m^2).

DISCUSSION

In this preliminary investigation, the differing growth habits of the four wheat varieties tested did not affect their competition with annual ryegrass.

The absence of any differential effect on wheat growth by early jointing indicated that early growth habit did not influence competition. As both Smith and Levick (1974) and Reeves (1975) found that the damaging effects of ryegrass on wheat were mainly restricted to the pre-tillering period, it would have been surprising if competition after jointing was significant in this experiment. The results obtained confirmed the importance of early competition, for despite the large differences in height of the tall and short varieties at anthesis, grain yield reductions (as a percentage of the weed-free treatment) were similar for all varieties.

This investigation was only a pilot experiment. The absence of differences in ability to compete with annual ryegrass may have been purely due to inherent similarities in the varieties used. It is possible that the differences in growth habit were not marked enough to produce differences. Further work involving the screening of a large number of wheat genotypes under a range of weed densities is being carried out.