



# Plant Production Science

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### Response to GA and Variation of the Culm Length in Doubled Haploid Lines of Wheat

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**Abstract:** An  $F_1$  hybrid with the semi dwarf genes, *Rht1* and *Rht2*, was crossed with *Hordeum bulbosum* and maize (teosinte) (*bulbosum* method and maize method) to produce doubled haploid (DH) lines, and 102 seedlings of each DH line produced by the two methods were treated with GA. The sensitivity to GA was shown by the GA index (GAI) which is (length of the first leaf sheath (LS) in GA-treated seedlings/length of LS in GA-untreated seedlings) $\times$ 100. The scatter diagram of GAI plotted against culm length was divided into three groups, low, medium and high GAI groups. The segregation ratio of these gametophytic phenotypes was close to the expected ratio; 1:2:1=*Rht1Rht2*:(*Rht1rht2+rht1Rht2*):*rht1rht2*, in both DH lines produced by the two methods. The frequency distribution of culm length in  $DH_3$ ,  $DH_4$ ,  $DH_5$  and  $DH_6$  populations from DH produced by the *bulbosum* method showed two peaks, though that in  $F_3$ ,  $F_4$ ,  $F_5$  and  $F_6$  populations from the same  $F_1$  hybrid (non-selective population) showed a continual normal distribution. The ratio of individuals with a shorter culm length to those with a longer culm length in DH lines was close to the expected ratio; 1:3 [*Rht1Rht2* : (*Rht1rht2+rht1Rht2+rht1rht2*)]. The frequency distribution of culm length in  $F_6$  was significantly different from that in  $F_3$ - $F_5$  populations, indicating an unintentional selection during the generation of the selfed hybrid, but the frequency of short culm relative to long culm individuals was lower in  $F_3$ - $F_6$  populations than in DH lines. These findings suggest the usefulness of selecting the medium culm-length lines in the DH lines produced by the

*bulbosum* or maize method in addition to examining the GA sensitivity (GAI).

**Keywords:** [Culm length](#), [Doubled haploid](#), [Gibberellic acid response](#), [Hordeum bulbosum](#), [Intergeneric cross](#), [Triticum aestivum](#), [Zea mays](#)

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