EFFECTS OF A RANGE OF GIBBERELLIN STRUCTURES ON GROWTH OF *PISUM SATIVUM* GENOTYPES DIFFERING IN SHOOT ARCHITECTURE

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ABSTRACT

We have been studying the effects of a range of differing gibberellin (GA) structures on pea genotypes whose shoots are GA deficient (*le*) and also possess distinct shoot architectures (Fig. 1). GA deficient determinate and indeterminate lines differing in the number of flowers produced on a reproductive branch (WT (*le*), *det*, *det multi* and *ultra*) were grown under an 18 hr long day (LD) and 25 µg of GA_3, GA_1, GA_4 and two ring D-modified GAs were applied once. The modified GAs were 16,17-dicholoromethano-dihydroGA_5 (DiC) and an exo-rich mixture of 16,17-dihydroGA_5 isomers (dihydro GA_5). DihydroGA_5 is a competitive inhibitor of GA_{20} or GA_9 3-β hydroxylation and DiC may also function in this way. Plant height, node of flower initiation (NFI), number of flowers at the NFI, seed number per plant and number of axillary branches > 10 cm were measured.

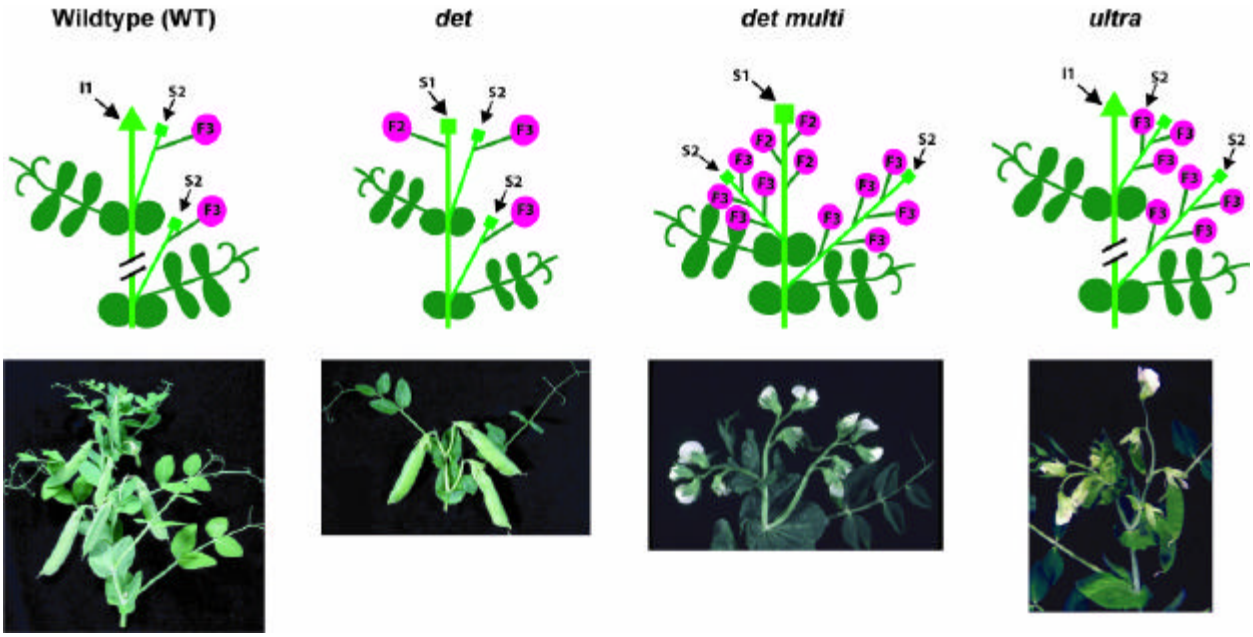

Figure 1: Phenotypes of different *P. sativum* inflorescence architectures showing a range of inflorescence morphologies in a dwarf background (*le*). 1st order inflorescence meristem (I1), 1st order inflorescence meristem terminating as a stub (S1), 2nd order inflorescence meristem terminating as a stub (S2), 2nd order floral meristem (F2), 3rd order floral meristem (F3).

GA treatment had no effect on node of flower initiation or number of flowers produced at the NFI (data not presented). Plant height was significantly increased by GAs, including DiHGA_5 and DiC (Table I). Axillary branching and seed yield also differed in response to GA

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treatment (Figure 2), the determinate lines producing more axillary branches following GA treatment, especially the *det multi* line.

Table I. Response of 4 genotypes of pea to dihydro GA_5, DiC, GA_4, GA_1 and GA_3. Seeds were sown in soil-less potting mix (Prime-Gro7, Therm-O-Rock East, New Eagle, PA) in 15 cm pots in growth rooms. LD (18 hr light/6 hr dark) was maintained with high pressure sodium and metal halide lamps (1:1) for 8 hr, followed by 10 hr of incandescent light. GAs (25 µg per plant) were applied to the apical bud in a 10 µL drop of 50% ethanol when there were 6 expanded leaves. Data are means of six replicates ± standard error.

	Final Plant Height (cm)			
Gibberellin	WT(*le*)	*det*	*det multi*	*ultra*
Control	112.0 ± 5.4	104.6 ± 2.7	108.5 ± 4.1	108.5 ± 1.7
$DHGA_5$	123.8 ± 3.8	105.0 ± 2.2	119.3 ± 4.4	118.8 ± 4.0
DiC	121.0 ± 1.8	101.7 ± 2.7	118.2 ± 2.5	105.6 ± 3.4
GA_4	127.8 ± 7.9	114.3 ± 3.8	131.8 ± 2.7	133.4 ± 9.8
GA_1	169.7 ± 6.7	126.7 ± 4.4	179.6 ± 4.2	140.5 ± 6.5
GA_3	143.8 ± 11.6	133.5 ± 4.6	173.2 ± 5.2	131.5 ± 5.5

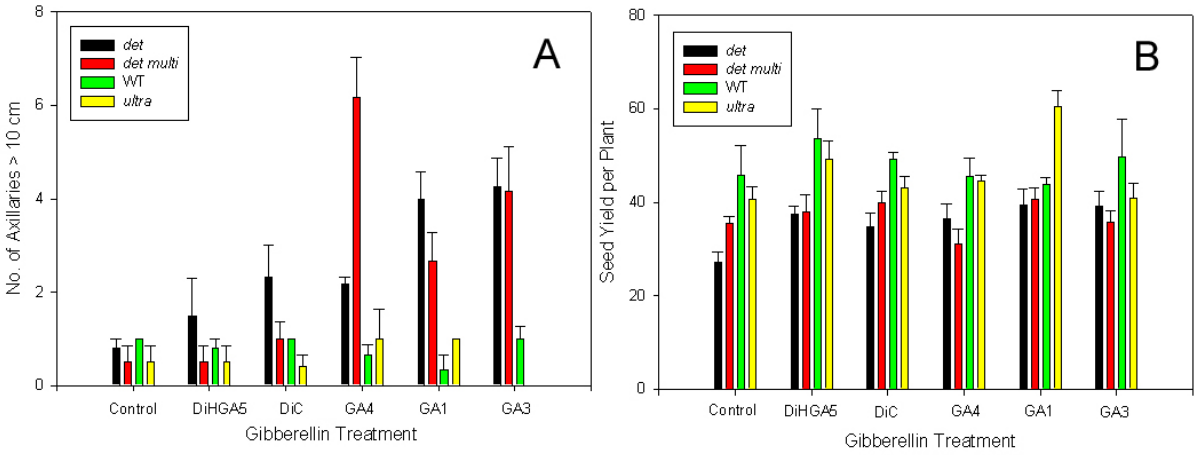

Figure 2. Effect of dihydroGA_5, DiC, GA_4, GA_1 and GA_3 on A) the total number of axillaries > 10 cm per plant and B) number of seeds produced per plant. Each bar represents the mean of six plants ± the S.E. of the mean.

In summary, treatment with GAs and Ring D-modified GAs primarily affected plant height, axillary branch numbers and seed yield in these four pea genotypes. The *det multi* line produced the most axillary branches in response to GA_4, while the highest yield was produced in the *ultra* line following GA_1 treatment. We thank Prof. L.N. Mander, Res. School of Chemistry, Australian Natl. U., for the gift of Ring D-modified GAs. Supported by NSF 9977087.