ROTHAMSTED RESEARCH

Report for 1959

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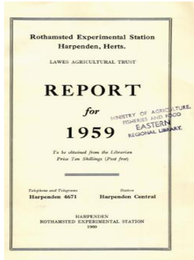
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The Effect of Two Plant-growth Hormones on the Pod Set and Yield of Field Beans

J. R. Moffatt and M. J. Hill

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crops will be grown on the sprayed land in 1960 to observe any residual effects.

In addition to the above experiments, some trial strips of winter beans were treated with "Simazine" and "Atrazine" in March 1959 when the crop was 4–5 inches high. Weeds already present were affected but were not killed by the spray, but the treated plots contained very few weeds that germinate in spring. Mayweed (*Matricaria inodora*), which was plentiful on the unsprayed strips, was well controlled. Beans on strips treated with "Atrazine" at 1 lb./acre, were stunted and damaged, but those treated with "Simazine" at ½, 1 or 1½ lb./acre were not visibly affected. Table 6 shows no loss of yield from the two smaller doses of "Simazine".

TABLE 6

Winter beans—Rothamsted—cwt./acre from unreplicated trial strips

O	S_1	S_2	S_3	A_2
27·8	27·4	27·9	24·3	21·3

The results in 1959 experiments, a year of exceptional weather, are considered promising and interesting enough to warrant further study.

The effect of two plant-growth hormones on the pod set and yield of field beans

J. R. Moffatt & M. J. Hill

Despite many husbandry experiments, progress in improving the yield of the field bean (*Vicia faba*) has been small. The yield depends on the number of pods which come to harvest, the number of seeds per pod and the weight of the seeds. Between varieties the weight of the individual seed and the number of seeds in each pod differ considerably, but within one variety these two factors are little affected by changes in field conditions. Only a small proportion of the flowers set pods that survive to harvest. The proportion that sets on individual plants depends on conditions in the crop, particularly on plant density, but the proportion per unit area of land does not, except at extremes.

In 1955 and 1956 field experiments of the randomised block type tested the effect of two plant-growth hormones, 4-chlorophenoxyacetic acid and α-(2 : 4 : 5-trichlorophenoxy) propionic acid, on the set of pods by spring-sown tick beans. The hormones were applied as a fine spray at a concentration of 5 p.p.m. starting soon after the first flowers opened. One lot of plants was sprayed twice, the two sprayings approximately a week apart, and another was sprayed weekly throughout the flowering period.

In 1957 only 4-chlorophenoxyacetic acid was used and the spraying was superimposed on an irrigation experiment at Woburn which incorporated a dung treatment. The plots were sprayed three times.

In all years yields were taken with a combine-harvester and pods were counted. In 1956 the seeds per pod were counted and the

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weight per seed measured from samples taken before harvest. In 1957 flowers per plant and the pods set per plant were also counted.

TABLE 1

Mean yield of beans—cwt./acre

	No spray	4-chlorophenoxy-acetic acid		α-(2 : 4 : 5-trichloro-phenoxy) propionic acid	
		2 app.	*3 app.*	*2 app.*	*3 app.*
1955 Mean (±1·21)	12·0	13·9	12·0	9·7	11·0
		2 app.	*4 app.*	*2 app.*	*4 app.*
1956 Mean (±0·80)	24·4	25·7	27·0	23·0	22·7

Table I gives the yields and shows that the only significant effects were that two applications of α-(2 : 4 : 5-trichlorophenoxy) propionic acid decreased yield in 1955 and four applications of 4-chlorophenoxyacetic acid increased it in 1956. The number of pods per plant was not appreciably affected in either year.

TABLE 2

Mean yield of beans—cwt./acre

(±0·62)	No irrigation or dung	Irrigation	Dung	Irrigation and dung
No hormone	15·8	33·1	17·6	32·1
3 applications of 4-chlorophenoxyacetic acid ...	15·5	32·4	17·4	34·8

In 1957 (Table 2) irrigation doubled the yield, and dung without irrigation increased yield slightly but significantly. The hormone increased yield only on plots with both dung and irrigation, and here the increase was small.

TABLE 3

1957—Pod, flower and bean counts

	Treatments								
	None	c	d	cd	h	ch	dh	cdh	
Pods/stem at harvest	5·60	9·20	6·00	8·00	4·80	7·50	5·80	9·20	±1·18
Beans/pods ...	3·08	3·04	2·71	3·09	2·94	3·20	2·84	3·13	±0·063
Wt. of beans gm.	0·400	0·404	0·408	0·394	0·408	0·429	0·444	0·415	±0·0201
Flowers/stem ...	36·80	66·90	40·30	61·00	36·20	59·20	35·40	60·20	±4·84
Flowers/pod set *	5·92	4·95	6·17	5·32	5·55	5·68	4·92	5·35	±0·297
Flowers/pod harvest	7·93	7·14	8·62	7·75	8·26	8·33	8·06	7·57	±0·491

* Counted 1 July.
c = Irrigation.
d = Dung at 12 tons/acre.
h = 4-chlorophenoxyacetic acid applied 3 times during flowering at conc. 5 p.p.m.

Table 3 shows that irrigation greatly increased the number of flowers per stem, but much of the increase was in flowers formed late at the top of the plant, few of which probably set pods. The increase in set at the lower nodes, therefore, was probably more than

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is indicated by these figures. However, there are no node-by-node figures to support this idea.

The only effects of the hormone on either the pod set or the number of pods at harvest were to increase the set of flowers on the dung plots and to decrease it on the irrigated plots. By harvest these effects had disappeared. If, as is sometimes suggested, failure of pods to set and survive to harvest reflects a deficiency of hormone, the hormones we used did not correct the deficiency.

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