No. 44 IMPORTANCE OF SOIL, CLIMATIC AND OTHER FACTORS ON PRE-EMERGENCE HERBICIDES

by B. J. Hall+

It is very difficult to reproduce the results obtained in a particular experiment if the conditions peculiar to that experiment are not identical or nearly so and it is very difficult to adequately control experimental conditions once the fairly controlled conditions of a glasshouse or experimental plot are converted to commercial ones. Furthermore, experimental conditions at one site can by no means be expected at another.

It would seem that much of the many and varied results and reactions credited to herbicide, weed and crop in weed control experiments are in part due to insufficient control over experimental conditions and this should be countered; but possibly more is due to variation in environmental factors operating at the different experimental sites. Some of these factors are discussed below.

The commercial effectiveness of most herbicides depends on the occurrence of the most suitable factors for each.

1. FACTORS

(a) Previous Crops and Associated Weeds.

Some crops, e.g. maize and melons, are very poor weed competitors, especially in early stages of growth. Heavy build-ups of weed population make the number of germinating weeds very high.

At Richmond in 1959 in ground previously growing weedy watermelons, a post-emergence weed control trial in beetroot had to be abandoned because the emerging crop was prematurely choked out.

+ New South Wales Department of Agriculture.

(b) Resistant Weeds.

The presence of these, either partly or wholly, in the trial area can also upset weed counts.

At Maitland in 1958 a trial was set out to compare effects of CDAA and CIPC in onion crops. Over one corner of the trial, deadnettle (Lamium amplexicaule) was concentrated. This is fairly resistant to herbicides and so weed counts in that corner were higher than elsewhere, as shown in Figure 1.

FIGURE 1

PLAN OF LAMIUM COUNTS TOTALS (heavy area of infestation is shaded).

CIPC (lb./ac.)					CDAA (lb./ac.)			
2	3½	5	6½	Control	2	3½	5	6½
34	19	9	3	19	20	6	6	11
31	21	4	7	23	23	16	18	20

CDAA (lb./ac.)					CIPC (lb./ac.)			
2	3½	5	6½	Control	2	3½	5	6½

(c) Soil Type

Proportions of sand or clay, quantity of organic matter and nutrients present are all of considerable importanee.

Table 1 shows onion counts which are total plant counts taken from a trial on fairly heavy dark soil at Richmond.

Table 2 gives similar counts from a trial on coarse light flood sand at Maitland.

Onion numbers are affected by CDAA but not by CIPC on the heavy soil, but by CIPC and not CDAA on the light soil.

TABLE 1

TOTAL PLANT COUNTS - RICHMOND TRIAL

Rate (lb./ac.)	CIPC	CDAA	Control
2	39	39	32
4	44	24	.
6	38	13	.
8	46	12	.

TABLE 2

TOTAL PLANT COUNTS - MAITLAND TRIAL

Rate (lb./ac.)	CIPC	CDAA	Control
2	32	32	35
3½	19	33	.
5	19	29	.
6½	6	30	.

(d) Soil and Air Temperatures

Many herbicides have been found extremely sensitive to changes in such. DNBP, Potassium cyanate, MCPB and CIPC are all such examples.

To again use CIPC, CDAA and onions as an example, the figures in Table 3, extracted from a Richmond area in which identical trials were repeated over a four month planting period on adjacent blocks should serve as an illustration.

TABLE 3

Non-grassy weeds expressed as a % of Untreated Controls.

Rate	February	March	April	May-June+
CIPC				
0 lb./ac.	100	100	100	100
2 lb./ac.	100	60	60	60
3 lb./ac.	100	60	60	+ 50
4½ lb./ac.	100	60	60	30
6 lb./ac.	60	60	25	15
CDAA				
0 lb./ac.	100	100	100	100
2 lb./ac.	70	45	25	70
3 lb./ac.	55	25	25	+ 70
4½ lb./ac.	35	25	25	70
6 lb./ac.	25	15	25	60

+ These May-June percentages are estimates based on results obtained from additional trials in subsequent years.

(e) Rainfall and Irrigation

Application of water whether through the agencies of man or nature is of prime importance in getting an effective weed control.

The figures given in Table 4 are weed counts taken from gladiolus trials - (a) where neither rain nor irrigation was possible between planting and taking counts and - (b) where adequate rain and irrigation was applied.

TABLE 4

	Trial 1				Trial 2		
Weed Numbers	TCA 2,4-D 10+ 20 lb./ac.	2,4-DES 2 lb./ac.	2,4-DES 4 lb./ac.	Control	CMU 1½ lb./ac	CMU 1½ lb./ac.	Control
(a)	102	601	470	959	1030	579	959
(b)	6	28	28	693	204	72	459
Weed Numbers	TCA 2,4-D 10+ 20 lb./ac.	2,4-DES 3 lb./ac.	2,4-DES 6 lb./ac.	Control	CMU 1 lb./ac	CMU 2 lb./ac.	Control

It appears almost certain from work done in the past two years that blame for the apparent erratic herbicidal records of CMU, CDAA, and to a lesser extent, CDEC, Simazin and CIPC can be traced to lack of moisture at the crucial stages.

CIPC, CDAA and CDEC must be incorporated in the soil as a surface barrier to weed germination without, especially in the case of CIPC, being moved too far down into contact with the crop seed. In particular, the more insoluble CMU, Neburon and Simazin must not be leached down too far too soon. With flower bulbs, fruit vines and trees, deep planting or deep rooting habit avoids unnecessary root contact with the herbicide and absorption into the plant system.

In New South Wales where pre-emergence crops are involved, a medium to fine seedbed is recommended - not too fine or surface caking of the soil occurs. Following planting of the seed, corms, etc., preferably in a moist seedbed, care is taken that the surface does not dry out. If 30-50 points of rain have not fallen 3 days after spraying, then this amount is added by light irrigation followed by another similar quantity if necessary 3-4 days later to get seed through.

Heavy rain is unfortunate but unless extremely so even this has been found preferable at this stage to none at all.