NITROGEN DEFICIENCY IN CLONAL PLANTS

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Our experience with clonal material has indicated that clonal plants often show deficiency symptoms, *e.g.* of magnesium (Mulder & De Silva, 1959) and nitrogen, much more clearly than does seedling tea.

Apart from the fact that a symptom is always more noticeable on an area with uniform plants than on an area with genetically different seedling plants, the explanation of this phenomenon is probably two-fold:

(1) a clonal plant, having been specially selected for vigorous growth, generally grows more quickly and produces more flush than most plants grown from seed. Accordingly, its food requirements are higher than those of most seedling plants, which grow more slowly;

(2) although clonal plants will eventually have an extensive root system, which will penetrate to the same soil levels as the tap roots of seedling plants do, it seems possible that clonal plants may have initially more superficial roots. This will make them more sensitive to drought at first, but also more responsive to fertiliser application.

Acute nitrogen deficiency symptoms in the flush were not commonly observed before the development of vigorously growing clones, such as TRI 2024. Plants of this clone (and of certain others, and even some seedlings) often develop a typical pinkish-yellow flush, which was at first thought to be a genetic character, but was later proved to be a manurial deficiency (Visser, Kehl & Tillekeratne, 1959). This characteristic is only genetical in so far that clone 2024 may show it more noticeably than other clones.

Experimental

It was suspected that the element lacking was nitrogen so that in order to confirm this conclusively a trial was done in which the nitrogen was applied in the form of urea. In this trial four-year old bushes of clone 2024 which showed pink-leaf symptoms were sprayed once, twice, three and four times respectively with 6% urea at weekly intervals and at a rate of about 75 gallon solution per acre; each treatment was represented by 5 bushes; bushes sprayed with water served as a control.

All pinkish leaves were counted at the start of the trial and thereafter weekly; distinction was made between undamaged leaves and damaged ones (*e.g.* by blister blight) taking into account the possibility that the pink colour of damaged leaves may be rather a wound reaction than a deficiency symptom.

TABLE 1.—*The number of pink leaves per 5 bushes (number of damaged pink leaves between brackets) after spraying with 6% urea: (a) 0, (b) 1, (c) 2, (d) 3 and (e) 4 times respectively, at weekly intervals.*

Column: 1	2	3	4	5	6
Times Sprayed	Date of Assessment				
	26/8/60	2/9/60	9/9/60	16/9/60	23/9/60
(a) 0x	103 (32)	135 (46)	123 (30)	122 (30)	126 (28)
(b) 1x	152 (68)	109 (43)	119 (28)	100 (4)	124 (17)
(c) 2x	91 (33)	80 (34)	30 (10)	23 (0)	10 (4)
(d) 3x	101 (35)	84 (41)	27 (16)	8 (0)	0
(e) 4x	101 (32)	87 (46)	38 (17)	18 (0)	0

Columns 2, 3, 4 and 5 give the dates of the 1st (start of trial), 2nd, 3rd and 4th sprays respectively.

It will be seen from Table 1 that the spraying with urea rapidly cured the nitrogen deficiency symptoms; two weeks after the trial started, the bushes which were sprayed twice by that time (column 4: *c, d, e*) had markedly less pink leaves, whether or not damaged, as compared with the control (*a*). Two weeks later (column 6), the symptoms had completely disappeared on bushes sprayed three and four times and nearly so on bushes sprayed twice. The bushes were completely green at that time, producing healthy shoots. Judging by the undiminished number of pink leaves, spraying once (*b*) was not successful, though it was observed that the leaves were less pink or yellowish than those on the unsprayed bushes.

The spraying caused some scorch, which after 1, 2, 3 and 4 spraying rounds amounted to 0, 3, 6 and 17% respectively of the shoots which were present 4 weeks after the experiment started. The damage was, however, not severe and scarcely noticeable two weeks later.

A similar trial was carried out with a 3% urea spray, applied once, and twice with an interval of a week. Three weeks after the single spray and two weeks after the double spraying, the number of pink leaves amounted to 1/3rd and 1/5th respectively of the number on the control plot, thus again showing a rapid disappearance of the deficiency symptoms; no scorch occurred.

Conclusions

Unless planters are aware of the tendency of certain clones to suffer more acutely than seedling tea from mineral deficiencies, and are able to recognise these deficiencies and to take remedial action, trouble may result. For this reason, the symptoms of nitrogen deficiency in TRI 2024 are illustrated in the colour plate (No. 2)* accompanying this note. Naturally the symptoms are not so evident in all instances and with all clones. In certain cases the young leaves may be very light yellow or have only a pinkish hue. The symptoms of this deficiency develop particularly when the plants are first put into baskets and again when they are planted out in the field.

There are several possible treatments for acute nitrogen deficiency symptoms:

(1) better distribution of the present quantity of nitrogen over the year by more frequent manuring with smaller quantities of fertiliser;

(2) an extra dose of ammonium sulphate. It should be stressed that this is only advised for confirmed acute cases of nitrogen deficiency, and this does not mean a change in the manuring policy of the Tea Research Institute;

*Colour Plate No. 1. of magnesium deficiency, was published in the Tea Quarterly, December 1959.

Fig.1. - Nitrogen deficiency - Clone TRI 2024

Fig.2. - Healthy shoot - Clone TRI 2024

(3) foliar application of nitrogen by spraying of urea. The described experiments, confirming those done at the Tocklai Experimental Station (Dutta, 1959), have shown that this is indeed a possibility. It would not be practical commercially to spray such large quantities of solution (75 gallons per acre) as we did, but it is likely that several sprays of 6% urea at the rate of 20 gallons per acre would also have the desired effect. If urea can be mixed with the fungicide used against blister blight, then no extra cost, apart from that for the urea itself, will be incurred. There is, however, the possible danger of a corrosive action of the mixture to spraying machines. This point is under investigation.

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References

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