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TRANSLOCATION EXPERIMENTS IN THE FIELD WITH THE LEMNA GIBBA – LEMNA MINOR COMPLEX

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SUMMARY

Translocation of a clone of the flat form of the *Lemna gibba – Lemna minor* complex to the site of a gibbous population resulted in a persistence of the flat form, which is indicative of a genetical basis of the frond shape of this flat clone.

1. INTRODUCTION

The problem of the phenotypic heterogeneity within the species *Lemna gibba* L. and *L. minor* L. remains under investigation (inter alia DE LANGE & SEGAL 1968, DEN HARTOG 1968, DE LANGE & PIETERSE 1973). In the last-mentioned paper evidence was submitted for the existence of a partly genetical basis of this heterogeneity, although it has been ascertained that in other cases it is attributable to reversible modification. It appeared hardly possible to find consistent morphological and anatomical differences between flat forms of either type. In the present paper the result of translocation experiments is reported in which a strain, remaining flat when cultured in an EDDHA-containing medium, was introduced at the site of a gibbous population whose flat modification reacted strongly to the presence of EDDHA (DE LANGE & PIETERSE 1973, strains 12 and 9, respectively).

2. MATERIALS AND METHODS

Twenty specimens of strain 12, originating from a ditch in the "Westzijderveld" near Zaandijk, aseptically cultured from one plant, were placed in an isolation-net in a ditch near Amstelveen, the original site of strain 9 *(fig. 1)*. In a second net 20 specimens of the local population were isolated in order to ascertain the possible influence of the net (e.g. through shading) on the habit form. The isolation nets, made of nylon gauze, mesh width 0.2 mm, were cylindric (height 80 cm, diameter 40 cm), with a floating ring on the water surface and fixed in the ditch bottom in such a way that about half of the net emerged from the water. The nets were closed at their lower end and ensured complete isolation of the *Lemna* strains from the surrounding floating vegetation, while not hampering the water exchange.

At the start of the experiment all plants of strain 12 were flat, with macroscopically visible air chambers when viewed in transmitted light. The local popu-

Table 1. Size differences in mm between the clones.
(a: minimum value; b: maximum value; c: mean value).

strain	date	length			width			thickness		
		a	b	c	a	b	c	a	b	c
strain 12	8.6.'73	3.5	4.4	4.0	2.8	3.3	3.0	0.5	1.0	0.7
strain 12	7.8.'73	3.5	4.2	3.9	2.3	3.9	2.9	0.6	1.0	0.8
local population (inside net)	7.8.'73	3.4	5.8	4.9	3.0	5.2	4.3	3.0	4.5	3.8
local population (outside net)	7.8.'73	4.2	5.7	4.9	3.2	4.8	4.0	2.9	4.3	3.7

lation was gibbous, both in- and outside the isolation net. After 2 months the experiment was discontinued and the plants were measured with a sliding gauge with nonius *(table 1)*. By this time the water surface within the nets had become entirely covered with the duckweed plants *(fig. 2)*.

3. RESULTS AND DISCUSSION

From *table 1*, and *fig. 3* it is evident that clone 12 did not show a convergence in habit form towards the gibbous local population. Also a marked difference in colour between the clones was observed, clone 12 being entirely

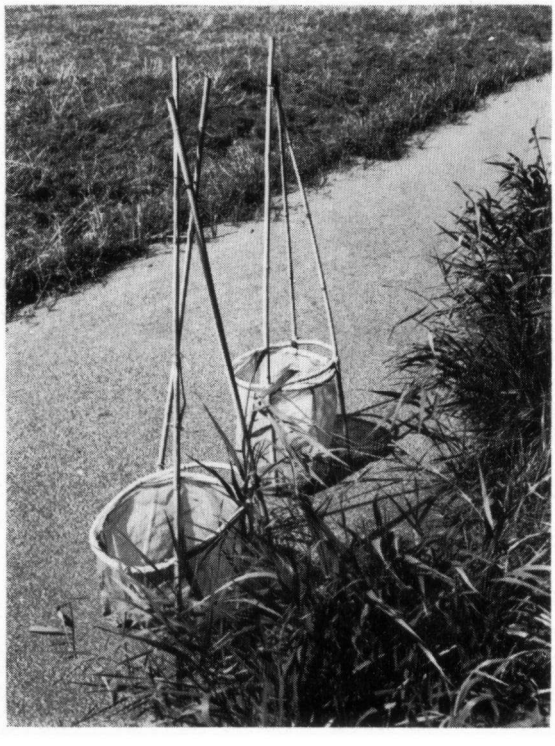

Fig. 1. The isolation nets in situ.

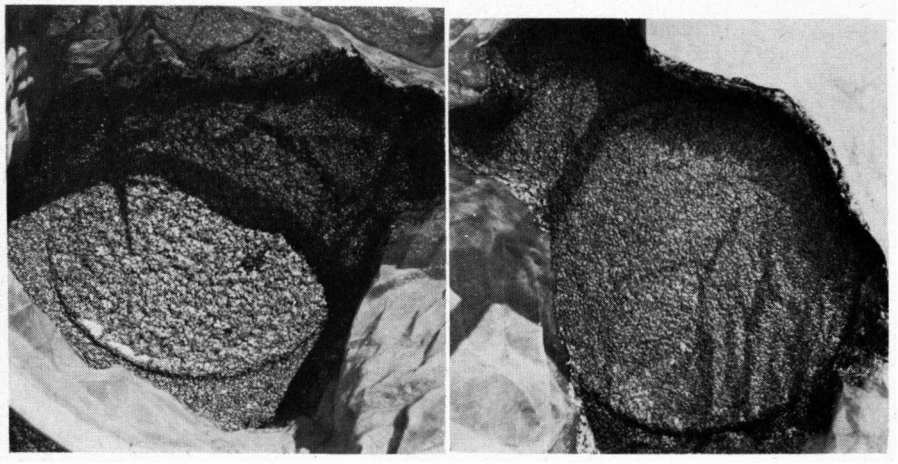

Fig. 2. The clones within the isolation nets at the end of the experiment, showing different aspect of local population (left) and strain 12 (right).

green, but the local population, both inside and outside the net, containing about 25% red specimens. Moreover, no differences in the dimensions or the colour of the plants of the local population grown inside and outside of the net could be detected.

This result is in accordance with experiments in vitro (see DE LANGE & PIETERSE 1973) and confirms the previously supposed genetical basis of the observed morphological differences.

Conceivably, the flat forms have other ecological ranges than the gibbous ones (compare DE LANGE & SEGAL 1968, DE LANGE, 1972) and this would justify their separate treatment in synsystematics. Accordingly, in the *Lemno-Spirodeletum* (W. Koch 1954) Th. Müll. et Görs 1960 and in the *Ceratophyllo-Lemnetum* De Lange 1972 the flat form, and in the *Wolffio-Lemnetum gibbae* Bennema 1943 (1946) the gibbous form of the complex might be the appropriate differentiating form. Apparently both flat modifications and flat ecotypes can be found

Fig. 3. Two typical specimens of local population (left) and strain 12, after the experiment.

in suitable environments, but mixed (flat and gibbous) populations occur as well (DE LANGE & PIETERSE 1973). The genotypically determined flat form might be identical with the "classical" concept of *Lemna minor* L., but if this is indeed the case, this species is up to now indistinguishable in the field from flat modifications of *L. gibba*, their differentiation requiring cultivation in vitro or translocation experiments.

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