FLOWERING OF SPIRODELA POLYRHIZA (L.) SCHLEIDEN

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SUMMARY

Flower production in *Spirodela polyrhiza* is possible in laboratorial conditions. Casein hydrolysate stimulates flowering.

1. INTRODUCTION

In an article on flowering of Lemnaceae SAEGER (1929) reported that flowering of *Spirodela polyrhiza* (L.) Schleiden has been rarely observed. Also HILLMAN (1961) reported that flowering of *Spirodela polyrhiza* is extremely rare. Some experimental work about flower production of Lemnaceae was done by HICKS (1932). He studied the influence of mineral salt deficiency, different nutrient solutions, photoperiodism, different light intensities, and ultra-violet rays on flowering. Some of these factors caused flowering in some Lemnaceae species but *Spirodela polyrhiza* failed to flower. According to SMITH & CASTLE (1960) *Spirodela polyrhiza* has not been observed to flower in the laboratory.

In experiments about frond multiplication and turion production we found flowering fronds last year. This year flowering fronds were observed for the first time in the middle of April. From that time till July the influence was studied of gibberellic acid and casein hydrolysate on flowering. More flowering fronds were found when there was casein hydrolysate in the medium.

2. MATERIAL AND METHODS

Erlenmeyer flasks of 300 ml were filled with 100 ml of basic medium, containing the following quantities of substances in mg per 1000 ml of water: NH_4NO_3 66, $Ca(NO_3)_2.4H_2O$ 83.5, $MgSO_4.7H_2O$ 166, $ZnSO_4$ 21, $MnSO_4$ 5, $CoSO_4.7H_2O$ 0.3, $CuSO_4.5H_2O$ 1.3, $Na_2MoO_4.2H_2O$ 8.3, H_3BO_3 5, Na-EDTA 166, KH_2PO_4 86.2, Na_2HPO_4 2 aq., $FeSO_4$ 8.3, KCl 10.5. This solution was adjusted to an initial pH of 5,5 with 1,5 n KOH. Gibberellic acid (Berelex Powder) was obtained from Imperial Chemical Industries Ltd. (Yalding). Casein hydrolysate of the British Drug Houses Ltd. (Poole) was used.

Media were sterilized for 90 minutes at 100°C. The flasks were inoculated with a mother frond with one visible daughter frond. The inoculated flasks were placed in continuous light (Philips TL. 55/40 W, 20.000 erg/cm²/sec within 400–800 mμ) and a temperature of 27°C.

At the end of the experiment, 30 days after inoculation, the visible flowers were counted, not the flower primordia.

3. RESULTS

We never found flowers on freshly inoculated fronds. At about 17 days after inoculation we saw the first flowers in the flasks containing media with casein hydrolysate + gibberellic acid. Flower formation and turion production sometimes take place at the same time and even in the same reproductive pocket of a frond. The figures in *table 1* show that casein hydrolysate in the medium stimulates flowering. This table also shows that gibberellic acid stimulates turion production. Never flowers were found in flasks with a completely inorganic medium.

Table 1. The influence of addition of various substances to the basic medium on the production of fronds, turions and flowers of *Spirodela polyrhiza*.

additions to the basic medium	number of fronds per flask	number of flowering fronds	flowering fronds as a percentage of the total number of fronds	total number of turions	total number of fronds + turions
1 % sucrose	263	–	–	115	318
	249	2	0,8	141	390
	246	4	1,6	103	349
1 % sucrose,	298	14	4,6	73	371
casein hydrol.	288	18	6,2	55	343
20 mg/100 ml	333	15	4,5	82	415
1 % sucr. cas. hydr.	246	16	6,5	390	636
20 mg/100 ml,	212	20	9,4	428	640
GA_3 5.10^{-6} g/ml	217	29	13,3	260	477
1 % sucrose,	218	6	2,7	361	519
GA_3 5.10^{-6} g/ml	216	1	0,4	423	639
	225	1	0,4	395	620

4. DISCUSSION

These experiments show that flowering of *Spirodela polyrhiza* can take place in a medium supplemented with 1 % sucrose. However, the number of flowers increases when besides sucrose, casein hydrolysate is added to the medium.

We know from unpublished results that gibberellic acid raises the multiplication rate of fronds. However, frond production stops at a lower level when gibberellic acid is added to the medium. *Table 1* shows that turion production is stimulated by gibberellic acid. It is not clear if there is a real stimulating effect of gibberellic acid on flower production, when gibberellic acid is added to the medium besides sucrose and casein hydrolysate. Work is in progress to determine which factors in casein hydrolysate are responsible for stimulation of flowering.

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