Table 1. GROWTH OF TISSUE CULTURES FROM ENGLISH IVY STEMS EXPRESSED AS RATIOS OF FINAL TO INITIAL WEIGHTS. ALL MEANS ARE BASED ON 100 CULTURES, EXCEPT WHERE STATED

Order of transfer	Source of tissue	Temperature 24° C	27° C
First sub-culture	Young seedling	(30) 11·75	(10) 16·19
	Juvenile reversion	4·01 ± 0·31	8·20 ± 0·72
	Adult	1·44 ± 0·17	4·06 ± 0·50
Second sub-culture	Young seedling	—	10·96 ± 0·60
	Juvenile reversion	—	7·69 ± 0·46
	Adult	—	5·50 ± 0·36

plant is shown in Table 1, together with a similar culture taken from a young open pollinated seedling derived from the same plant. The weighings of the tissues were made on a small torsion balance using sterile techniques. Standard errors were calculated from 10 values each representing the mean of 10 cultures.

The higher temperature was preferable, particularly with cultures of mature tissues. The exceptionally high growth-rate of the cultures from the very young seedling should also be noted.

These results explain those reported by Privat[6], who, using a similar culture medium, was not able to establish sub-cultures from ordinary juvenile or mature stems of ivy, although the original cultures grew well. However, when very young seedlings were used, tissues from these stems could be sub-cultured successfully. Apparently the range of temperatures (22°–25° C) was too low to permit success with any but the latter type of tissue.

Sub-cultures from juvenile reversion and adult stems of *Hedera helix* transferred through nine generations at monthly intervals continued to show differential rates of growth. Typical responses are shown in Table 2.

Table 2. GROWTH OF TISSUE SUB-CULTURES FROM ENGLISH IVY STEMS EXPRESSED AS RATIOS OF FINAL TO INITIAL WEIGHTS (MEANS OF 50 CULTURES AT 27° C)

Order of transfer	Juvenile reversion	Adult
Seventh sub-culture	5·6 ± 0·4	4·4 ± 0·3
Eighth sub-culture	4·8 ± 0·4	3·9 ± 0·5
Ninth sub-culture	6·8 ± 0·5	5·7 ± 0·4

Experience with more than 13,000 sub-cultures during the past year has shown that those from juvenile stems maintained more than 20 per cent higher growth-rates than those from adult type tissue. Another marked difference was the considerably greater amount of root formation in the cultures taken from juvenile stems.

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[1] Robbins, W. R., *Amer. J. Bot.*, **46**, 485 (1960).
[2] Wareing, P. F., *J. Linn. Soc. Lond.*, **56**, 282 (1959).
[3] Stoutemyer, V. T., and Britt, O. K., *Nature*, **189**, 854 (1961).
[4] White, P. R., *Handbook of Plant Tissue Culture* (1943).
[5] Shantz, E. M., and Steward, F. C., *Ann. Bot.*, N.S., **23**, 371 (1959).
[6] Privat, Guy, *Naturalia Monspeliensia, Ser. Bot.*, **10**, 91 (1958).

Systemic or Semi-systemic Infection of Wheat with *Puccinia graminis tritici*

ERIKSSON[1] proposed the mycoplasm theory according to which rusts could persist in wheat seeds and thus produce systemic infection of wheat. Hungerford[3] and Mehta[4], however, could not substantiate the theory of mycoplasm.

Apparent systemic or semi-systemic infection in wheat seedlings with *Puccinia graminis tritici* was produced in test-tubes using the technique of inoculation described by me[2]. The variety of wheat used in these investigations was a club type from Afghanistan, locally known as 'Lucchak', and the stem rust race used for this work was a biotype of race 21 isolated from the country. This biotype differed from the key race 21 in that it produced a 1+ type of infection on Vernal, whereas the key race produces an O type of infection on that differential variety.

In an experiment with fifty seedlings, uredospore suspension of the stem rust fungus was injected with a hypodermic needle No. 18 near the growing point of 60–72-h. old wheat seedlings on May 22, 1962. All the seedlings showed infection with stem rust on the first leaf on May 29–31, 1962. However, in two of the seedlings in which rust pustules appeared on May 29, stem rust appeared on the second leaf on June 6, 1962, on the third leaf on June 11, and on the first tiller on June 14. Similar infections were also obtained in 3–4 per cent of the inoculated seedlings in test-tube experiments carried out in June 1962. This, therefore, shows that in those seedlings the infection with stem rust was of a systemic or semi-systemic type.

In another experiment seedlings were raised from surface disinfected seeds, and the inoculated plants when they showed infection on the first and second leaves were pulled out of the agar in the tube. The leaves and the rudimentary leaves enclosing the growing point were removed right from the base of the growing point so far as possible and the growing point tissue crushed on a slide. The undifferentiated tissue material on staining with cotton blue revealed the presence of hyphæ and uredospores of the rust fungus. It would, therefore, be seen that if stem rust of wheat could be established in the growing point of wheat seedlings, subsequent unfolding leaves would show infection with rust fungus.

Systemic infection of a mature wheat plant with stem rust was observed by me under field conditions in wheat variety Purdue 5759*B*4–5–3 listed as entry No. 93 of the International winter wheat rust nursery of 1962, seeds of which were received from Dr. W. Q. Loegering, of the U.S. Department of Agriculture. One wheat plant of this variety with 7 tillers showed 40 per cent rust infection on all the leaves and heads on May 15, 1962, when other varieties and the local varieties did not show a trace of stem rust infection. Stem rust must have appeared on this variety at least 10 days earlier. Stem rust infection was first noted in traces on the local variety and some other varieties on May 29, 1962.

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[1] Eriksson, J., *Biol. Zbl.*, **30**, 618 (1910).
[2] Gattani, M. L., *Nature*, **196**, 190 (1962).
[3] Hungerford, C. W., *J. Agric. Res.*, **24**, 607 (1923).
[4] Mehta, K. C., *Trans. Brit. Mycol. Soc.*, **8**, 142 (1923).

Effect of Raw Wheat Germ on Nutrition of the Chicken

DURING our investigations on the nutritional aspects of human sprue designed to find an experimental animal which might help in our basic understanding of this disease, we noted reports by Creek[1] that wheat germ had a deleterious effect on growth of chickens and that this was associated with an apparent increase in fat content of fæcal droppings. After further examination of his experiments[2] and after seeing the degree of 'contamination' of the raw wheat germ with flour as it comes from the mills, we felt that his results could possibly be accounted for by the adverse effect of gluten in the adherent flour.

Early experiments confirmed Creek's findings of poor growth and the fæcal fat[3] was as high as 20 per cent of fat intake in the wheat germ groups. When gluten was given as a substitute for the corn in the diet, however, we found that the birds fed gluten grew slightly better than controls ($P < 0·0125$) and there was no difference in fæcal fat content.