

A Reply to the Comments of S. M. Tavantzis

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We agree with Tavantzis's assessment of the current situation in that "the current terminology on plant response to virus infection ... is ... functional" ... if used properly (3). However, what prompted our letter (2) was the fact that such terminology is being used to denote different ideas (4). Our objective was not to "dispel confusion," as has been suggested (3), but to show that confusion exists and to make some steps toward the "... future improvements in usage of terms" so as to facilitate "the exchange of information unambiguously between scientists" (2). We recognize that such improvement will only come by a consensus of opinion among our peers. In this regard, we welcome the remarks made by Tavantzis but feel it necessary first to comment briefly on the main points he made and then to correct some of his misunderstandings of the definition of terms used in our letter (2).

We believe the confusion that exists is caused mainly by the failure to observe the distinction between the response of plants to (i) virus infection and invasion and (ii) the expression of the disease. The relative lack of research on these processes, and the attendant difficulties sometimes experienced in studying them (3) is no justification for not recognizing that this distinction exists. Recently introduced techniques of virus detection have overcome many earlier difficulties and, although assigning the response of plants to one category or the other may be "impractical" in some instances, we cannot see that this is necessarily "confusing" (3). Indeed, the recognition of such a distinction will not (as is suggested [3]) impede plant breeding for resistance to pathogens but will be an important step forward. We find it difficult to reconcile Tavantzis's wish for greater stringency in recognition of true immunity (a point with which we do not especially disagree) when he is content to leave blurred the distinction between the two aspects of the response to infection mentioned above.

We wish now to correct some of Tavantzis's misunderstandings and to clarify some definitions proposed in our letter:

Klendusity. We believe that the "disease escape" referred to as klendusity is caused by the failure of vectors to inoculate plants with virus. In practice, such plants are resistant to natural infection

with virus although, as we have pointed out (2), the mechanism by which this is achieved is indirect.

Tolerance and sensitivity. We state clearly that "sensitivity... will often [ie, not always] be associated with conspicuous symptoms" or with a diminishing of "plant growth or marketable yield" (2). Similar qualifications regarding tolerance are given in the text. There is therefore no difficulty in accommodating the examples given by Tavantzis (3), even though they are somewhat unusual in plant virology.

Immunity. We have no argument with Tavantzis about this term—the difference is, as he points out (3), one of compromise regarding the practical problem of testing for this character. Although the recent work on virus infection of protoplasts is informative, there are few comparable studies on the responses at the cellular level of intact plants. As techniques for virus detection improve, the definition of immunity need not change, only the stringency of the tests by which this character can be determined.

In conclusion, although we agree with Tavantzis that our knowledge of the complex interactions between host and pathogen is still very small, we nevertheless feel that advances in plant virology during the past few years make it necessary and also feasible to clarify the use of existing terms. However, we have tried to proceed cautiously, applying accurate definitions that are as broad as possible to terms in current use. We have been encouraged by the generally favorable response to our proposals and by the fact that they are in broad agreement with the views of the Terminology Committee of the Netherlands Society of Plant Pathology (1).

LITERATURE CITED

1. Bos, L. 1983. Introduction to Plant Virology. Longman, London and New York. 160 pp.
2. Cooper, J. I., and Jones, A. T. 1983. Responses of plants to viruses: Proposals for the use of terms. *Phytopathology* 73:127-128.
3. Tavantzis, S. M. 1984. The use of terms for response of plants to viruses: A reply to recent proposals. *Phytopathology* 74:379-380.
4. Thresh, J. M. 1981. Plant virus disease epidemiology. *Rev. Plant Pathol.* 100:571-575.

NOTE FROM THE EDITOR

S. M. Tavantzis has read Cooper and Jones' rebuttal to his letter to the editor, but he still does not agree that he misunderstood their original arguments. His view is that the distinction between plant virus infection and disease expression is widely recognized, but that Cooper and Jones' proposal on the use of resistance and tolerance to virus infection is not superior to the current usage of those terms in plant pathology.