

ization of 40+120 would cost an additional \$21/acre and would be more than the crop could use.

Second, soils testing very high do not need to be maintained annually. That is, the reduced rates with the sufficiency approach would be agronomically and economically sounder than the maintenance approach. This is not to say that fertilization can be discontinued indefinitely without adverse effects on crop yields. Rather, discontinuing or drastically reducing application rates while soil test levels are very high in P or K can be accomplished without significantly affecting yields. Therefore, the savings in fertilizer purchases would increase returns.

Third, corn and soybean yields did not significantly respond to any annual application of P and K in this study. It seems that adequate residual P and K prevented any yield differences associ-

ated with P and K levels over the eleven-year period. The economic savings could reach \$45/acre, depending on the initial application rate. Further research is needed to determine if sufficiency level recommendations can be lowered in some cases.

In summary, researchers must continue to determine if further reductions in fertilization can be realized without reducing yields. Extension workers must continue to develop ways to help farmers realize the usefulness of soil testing. Farmers must carefully evaluate their fertilization needs in conjunction with soil test results. Together, a more sustainable approach to P and K fertilization for corn and soybeans may be attained.

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LETTERS

Sustainable community must address broad issues

The article by MacRae, et al., "Policy, programs, and regulations...in Canada" (*AJAA* 5(2), 76-92) raises a number of issues which need to be addressed by the sustainable agriculture community. While one might hope to find some universality regarding the biophysical nature of sustainability, no one has, at this point, applied any cross cultural analysis to assess whether there might be universality to sustainability at a social and political level. For example, the authors cite the situation in Norway where government policy substantially shifted food production and dietary habits of the country. In other situations, Sweden has similarly been cited as a model for health care. Given the homogeneity of the populations in Scandinavia and socialist predilections of the government, it is questionable whether such a transfer-

ence is feasible or even desirable in North America in general, or even Canada in particular.

Next, the authors have created an interesting paradox. On one hand, they are asking government to develop more flexibility and innovation in farm programs. On the other hand, they wish this government flexibility to be used to preserve existing farm and rural community models. Significant thought has been given to alternatives to current government policy, and little consideration has been given to creation of new community models which might be developed along biological and environmental boundaries as opposed to traditional political divisions.

Third, the authors set up an inherent bias against trade. Given their desire to maintain a static model of community, there may be some merit to this position. But one should note that North American prehistory shows that there were extensive trade networks across

the continent which did not promote community destruction or consumption of non-renewable resources. The continent was discovered by Europeans primarily because of interests in trade opportunities. Designing for maximum local self-sufficiency with the exclusion of imports (perceived to be luxuries by some personal standard) is particularly questionable when it is not clear how to define "local".

The authors also ignore two critical points. First, there are many factors which have led to the current farm situation in Canada and the United States beyond direct legislation on agriculture. This includes the increased mobility of persons, goods, and information. In the U.S., the opening of the interstate system and the growth of electronic media have had much to do with shifts in the rural economy.

Second, legislation is always a compromise with no guarantees that the benefits and restrictions will have the

intended outcomes desired. For example, there is evidence that sustainable agriculture, and even organic farming, can be implemented more profitably by large farming operations instead of the "family farms" advocated by many in the sustainable agriculture community.

A famous psychologist once said that it is difficult to get one's "NO" back. Every time one abrogates social responsibility by turning to government to redress problems, one has removed power from him or her self to control and direct his/her life and that of the local community. The Canadians might wish to tread lightly until they see how the recent legislation in the United States plays out in program implementation with regards to organic and sustainable agriculture.

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Response: I like some of the thoughts put forward by Abeles but am confused by others.

Abeles alludes to some interesting questions regarding the relationship between policy that respects agroecological principles and the homogeneity of the population. We did not discuss this in our paper, but it would be most interesting to see a conceptual analysis of whether public policy that supports agroecological diversity can satisfy the needs of an ethno-racially diverse population.

I also like Abeles' conclusions on the need for more thinking on new farm and rural community models. I don't believe, however, that our analysis implies preserving existing models. To hold such a position would be a contradiction of basic ecological principles. Nor do we conclude that only small and family farms can produce food sustainably. Although we did not discuss it at length, the regional land use implications of a policy of food self-reliance imply very different patterns of agricultural production, processing and distribution, and very different intra-community dynamics. This is a very important area for further work.

It is not clear to me how the author has come up with his interpretation of our trade analysis. We are not saying that there shouldn't be trade, but rather that international and interregional trade should respect ecological principles. Simply stated, once a region has satisfied (in an economic and biophysical sense) its own markets, excess can be exchanged with other areas. Canadian trade and trade policy have never been designed around this idea.

Finally, Abeles misinterprets the reason for focusing our discussion on the role of government in the transition to sustainable systems. We are definitely not saying that government has the only role to play in this process. Community and farm organizations must actively push governments to change their agricultural agenda. We believe our paper serves as a "road map" for the political work of these organizations.

Rod MacRae

Questions experimental design

"The on-farm research program of Practical Farmers of Iowa" [Volume 5(4)] focuses on experimental design and analysis, yet several astonishing errors occur in the paper.

Someone must have been sleeping to allow the figure on page 164 to go uncorrected. The drawing illustrates no replication, rather than three replicates, as stated in the legend.

The paper states that 6 or more replications are needed in this design. Such general statements are misleading. The number of replications required to detect significant differences is dependent on 1) the magnitude of differences between treatments, 2) the amount of variation among replicates, 3) the desired significance level, and 4) depending on one's philosophy of comparison, the number of treatments in the experiment. How could such a blanket statement go unchallenged?

When referencing the figure, the authors use the terms "blocks," "replicates," and "pairs" interchangeably. The analysis of the data will be different depending on the exact grouping of

the treatments. If the treatments are arranged in true blocks or if more than two treatments are used, then an analysis of variance using F-tests is called for. If the treatments are grouped in pairs, then a paired t-test would be most appropriate.

Finally, the implication is made that long strip plots are suitable for all on-farm experiments. In the case of variety trials or herbicide tests, there are certain advantages. However, in the case of insect or disease management trials, large square plots may be more desirable since the target organism or management technique may not be static in space or time.

I am extremely pleased to read articles by farmers in *AJAA*, but in this particular case, some guidance from a competent reviewer was called for.

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Response: As the authors of the paper in question, and as technical editor responsible for its review, we appreciate Professor Pritts' taking the trouble to point out possible errors. However, we believe that, on closer examination, only one of his criticisms really qualifies as an error: the technical editor readily admits to somnolence in not catching the "Three Replications" legend, which should have read "Three Treatments."

The sentence about 6 or more replications being needed was not intended as a general statement. The right number of replications certainly does depend on all the things that Professor Pritts lists. In the paper, the statement in question was immediately followed by typical values of those very parameters (significance level, number of treatments, variance, etc.) for the experiments under discussion. We thought the statement would be understood in that light; that is, it obviously was intended to be taken in the context of the entire paragraph, not as a "blanket statement." Perhaps this would have