Letters

Controversial Uses of Herbicides

In "Some ecological benefits of woody plant control with herbicides" (1 Aug., p. 465), K. C. Barrons alludes to the controversial nature of some herbicide uses, such as defoliation in Vietnam, but a more objective summary of the literature on this subject would have appeared in order. For example, no mention is made of the fact that after being sprayed with 2,4-D some poisonous plants normally unpalatable become palatable to livestock, while certain palatable plant species are rendered toxic to animals because of excessive nitrate accumulation (*1*).

Barrons quotes a study in which "little if any inhibition of phytoplankton . . . growing in water containing 1 part of 2,4-D, 2,4,5-T, or Tordon herbicides per million" was found. However, Holden has pointed out that the lethal dose (LD_{50}) of 2,4-D for trout over a 24-hour period is 0.5 part per million (*2*).

In assessing "long-term" effects of Tordon heribicide, Barrons quotes studies in which evaluations were made up to 2 years after treatment. However, 14 years after spraying for sagebrush control in Wyoming, an operation similar to some I have visited this summer in Montana, the density of sagebrush was greater on sprayed than on unsprayed range (*3*). This could hardly be considered a desirable effect of spray treatment.

These are but a few examples of the risks associated with large-scale herbicide application which are omitted from the article.

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References

1. J. M. Kingsbury, *Poisonous Plants of the United States and Canada* (Prentice-Hall, Englewood Cliffs, N.J., 1964).
2. A. V. Holden, *J. Inst. Sew. Purif.* (1964), p. 361.
3. W. M. Johnson, *J. Range Manage.* **22**, 177 (1969).

Barrons defends the use of herbicides in Vietnam and elsewhere and suggests that the grazeable grass which develops after trees are killed conserves water. While grass may be locally useful under proper management techniques, my previous suggestion still stands that herbicides can have bad effects in the tropics (Letters, 25 Apr.). The flat experimental Panamanian grasslands he pictures are under light grazing in the rainy season. I have observed and photographed other Panamanian and Colombian secondary grasslands that showed gullying and wind erosion because normal use included burning during dry seasons, overgrazing, and gradual soil impoverishment. Too many secondary tropical grasslands do not provide much forage for cattle during dry seasons nor much protection from heavy rains in wet seasons. It seems that, unless new techniques are developed, tropical cattle can't have their water-conserving grass and eat it too. It would be wise to slow deforestation until tropical ranchers acquire such techniques.

Barrons' assumption that grass is better than forests is questionable. Grassland ecosystems are low and simple, so that only erosion is left when the grass is used, whereas complex forest ecosystems can produce a variety of products and still have cover, including some grass. Holdridge (*1*) and other tropical ecologists suggest that tree crops are best in tropical areas where forests are native, and grass and beef are best grown in areas where grasses are the natural cover. When large areas are turned into grass for cattle, this may lead to overproduction of one crop at the expense of the varied products a forest can produce. Before herbicides and other fast deforestation techniques are permitted to encourage one-crop or ephemeral economies, consideration should be given to total ecological requirements.

In Vietnam, broadcast herbicide deforestation does not have the desirable characteristics of local and careful technical creation of grasslands. The bamboos that Tschirley found moving in ("Defoliation in Vietnam," 21 Feb., p. 779) are not the kind of grasses cattle eat. There is no attempt to restrict defoliation to flat areas where there can be control of dry-season burning. Orians and Pfeiffer (Letters, 1 Aug.) noted that drifting defoliants have killed crops outside target areas. I reiterate that there are human as well as other biological reasons for taking care of deforesting tropical areas rapidly by herbicides or other means.

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Reference

1. L. R. Holdridge, in *Symposia Interamericana, No. 1* (Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, 1959).

I have indeed followed the results of research on the modification of the composition of plants after spraying (*1*). With respect to increased hydrocyanic acid content as well as nitrate after spraying, these factors must be understood by cattle and sheep ranchers and sprayed pastures must be managed accordingly. There have been very few instances of cattle poisoning from these chemically induced temporary modifications in plant composition. The benefits to be derived from the use of herbicides for the control of poisonous plants and livestock health seem to greatly outweigh this risk, which is not a risk at all with proper management (*2*).

As for toxicity to fish, 0.5 parts per million of 2,4-D is relatively safe if one considers the volume of water that is present even in a shallow stream. Four inches of water amounts to roughly one million pounds per acre, thus even a direct application of a pound of 2,4-D per acre would give a concentration far less than 0.5 parts per million in water of any appreciable depth. Actually, these materials are not applied directly to water except in specific situations, such as for water hyacinth where dosages for control have been determined and the safety to the fish present in these waters carefully studied. In Florida and Louisiana 2,4-D has proven very valuable for the control of water hyacinths. Any herbicides reaching water in which trout are present are incidental to the control of vegetation on terrestrial sites and would have to be measured in parts per billion.

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It is not surprising that there may be more sagebrush in some situations after spraying. The control programs are not intended to kill all the sagebrush and its recovery and, indeed, its spread will depend much on subsequent range management. I doubt that the increase in sagebrush can be attributed to the spray program.

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References

1. G. E. Lynn and K. C. Barrons, *Proc. Northeast. Weed Control Conf.* (Rutgers Univ., New Brunswick, N.J., 1952), p. 331.
2. J. M. Sund and M. J. Wright, *Down to Earth* (Dow Chemical Co., Midland, Mich., summer, 1959).

Less Materialism—More Tradition

Abelson's editorial "Microcosms in a world apart" (29 Aug., p. 853) states that "we are not getting our money's worth, and it is time that constructive thought and effort were devoted to making it possible for the majority of our citizens to enjoy what could be achieved in the way of spirit-building recreational facilities." Such a goal could be achieved in the next generation if we, the present generation, became less materialistic and acquired the Old World's veneration for and teaching of tradition—quite opposite to our habits of permissiveness.

I was born and brought up just around the corner from Frankfurt's Palmengarten and I appreciated Abelson's comments on its skilled landscaping and grassy glades. However, I also recall how sad I was when all that beauty disappeared temporarily during World War I to make room for growing potatoes!

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Botanical Congress

The U.S. National Committee of the XIth International Botanical Congress, held at Seattle, Washington, from 24 August to 2 September, passed the following two resolutions which should be of interest to readers of *Science*:

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