

From Research Results to Field Performance — Why the Gap?

B. B. FISCHER, L. M. BURTCH, and R. D. KUKAS¹

Received for publication March 11, 1974

During the past decade great progress has been made in the selective control of weeds in sugar beet production. Results of research presented at this symposium and at previous meetings of the American Society of Sugar Beet Technologists and the numerous studies published yearly in journals of the Weed Science Society of America and elsewhere attest to this progress.

Dr. Klingman, in his Presidential address to the Weed Science Society of America, said that "starting in about 1950, probably no other area in agricultural science has held the research and educational challenges of weed science." Herbicide sales in the United States constitutes 57 to 58 percent of the total pesticide sales. Despite this fact, agricultural losses due to weeds are greater than losses due to insect pests, diseases, and nematodes.

In sugar beets we have demonstrated the effective use of selective herbicides applied preplant.

But there are still too many commercial beet fields in which the beets cannot be seen because of the heavy weed population.

We have demonstrated the effective use of selective herbicides for the post emergence control of weeds in sugar beet fields.

But we see too many commercial sugar beet fields in which the weeds tower over the young beets.

We have repeatedly demonstrated the effective use of trifluralin and EPTC for the control of late emerging barnyardgrass, crabgrass, and summer annual broadleaf weeds.

But there are too many beet fields heavily infested with barnyardgrass at harvest.

Why the gap between research results and field performance? We publish the results of our research. We hold field meetings to show the results of our field experiments. And growers must be listening otherwise would they be buying the tremendous amount of herbicides being sold in the country?

¹Farm Advisor U.C.C.E., Chief Agronomist & Agronomist, Spreckels Sugar Co., a division of Amstar Corp., respectively.

We visited several fields last year where growers used pyrazon plus dalapon or phenmedipham for the control of weeds emerging with the beets. They applied trifluralin after thinning for the control of summer annual grasses and broadleaf weeds but at harvest their fields were heavily infested with sow thistle, prickly lettuce, ground-cherry, and flax leaved fleabane.

If our research findings are valid, and there is no reason to assume otherwise, why the gap between our research findings and the results we often observe in commercial beet fields?

Traditionally agricultural research was conducted at experimental stations and extension workers—county agents and farm advisors—extended the research findings to farmers through meetings, demonstration plots, and publications.

The best testimonial to the success of these methods is the fact that one American farmer can produce food for himself and 48 of his fellow men. But are these traditional methods adequate to convey the developed research information with adequate speed and thoroughness to meet today's needs?

As long as a gap exists between research findings and growers' practice can we consider our job done? We believe the adage that every worker engaged in research can subscribe to is "My information is no information unless you are informed of my information."

As early as 1961, Dr. Alcorn, Director of Agricultural Extension in California, talking to the staff at their Statewide Conference said, "It is most important for us to adjust our thinking to changes in the agricultural community. The diversity, specialization, and intensity of California's commercial agriculture, with its high capitalization, means that our extension program must be specific if it is to mean anything. It must be aimed at positive solutions of the more pressing problems that face the industry; our staff, of necessity, will have to do more field research."

We believe extension in California responded to Director Alcorn's summons, at least partially. More local field research is being conducted and positive solutions to the weed problems that face the sugar beet industry are being found. But conducting research, whether locally or at experimental stations, is not enough to maintain relevance to those we should be serving. Weed control research becomes relevant only when its results are used by growers to effectively control the unwanted vegetation in their crops.

Today a gap exists between research results and field performance. Therefore, as research workers we must ask:

- Have we failed to communicate clearly our research findings to the growers?
- Are the developed techniques too complicated to follow?

- Are the available chemical and mechanical tools ineffective in providing good weed control?
- Could we obtain more effective weed control through better land preparation prior to planting?
- Would better weed identification enable one to use herbicides more effectively?
- Would keeping better records of weed infestation enable us to choose the selective herbicides more effectively?
- Should we devote more effort to evaluating combinations of herbicides that are on the market?
- Should we spend more time training fieldmen and commercial applicators in the effective use of herbicides?

The answers to some of the questions are obvious. We certainly need more effective herbicides for the selective control of weeds in sugar beets.

It would be shortsighted not to continue evaluating presently available herbicides and combinations of herbicides.

We are in need of more effective tools with low energy requirements for the application and incorporation of herbicides.

Undoubtedly, we could select more effectively from the presently available herbicides if we would know what species of weeds are infesting the field. This is especially true when herbicides are used preplant or preemergence.

We have repeatedly demonstrated in field trials that sugar beets can be grown without the utilization of costly hand labor. But we must improve on communicating our research findings adequately to the beet growers.

We could do a better job working with fieldmen, commercial applicators, and pest control advisors. We could show them the results of our trials, familiarize them with proper timing and application of herbicides, and utilize their help in informing beet growers.

The techniques we demonstrated for the proper use of herbicides are not complicated or difficult. But we know that the timing of application and the adjustment of application and/or incorporation equipment can have significant influence on the performance of an herbicide.

We are aware of the fact that the activity and selectivity of herbicides can be influenced by many factors, such as soil texture, soil structure, soil salinity, the irrigation method used, the quantity of water applied, climatic conditions, weed species present, the vigor of weed growth, accuracy of the spraying calibration, the method of herbicide application, and so on.

It is difficult to list all conditions that a grower may encounter in his beet field and to try to enumerate what influence they may have on the performance of a particular herbicide.

Perhaps the complex nature of the problems encountered under field conditions is the reason for the gap between research results and field performance.

Weed control is more than the use of herbicides and electronic or mechanical devices. Effective weed control can be achieved only in a system of husbandry that utilizes all available tools and knowledge to produce a profitable crop free of unwanted vegetation. This is our definition of a vegetation management system.

And an effective vegetation management system embodies:

- Proper field selection
- Intelligent rotation
- Proper land preparation
- Timely irrigations
- Intelligent herbicide selection and careful application
- Good sanitation
- A vigorously growing crop.

We in weed control research need to be careful to avoid narrow specialization and to maintain a relevance to those that we should be serving.

So far we have emphasized that a gap exists between research results and field performance. We have enumerated the complex problems we encounter in vegetation management and suggested that the complexity of the problem may be the reason for the existing gap between research results and field performance. Perhaps we can look upon this as a challenge.

We would like to consider how to meet this challenge or how we can close or narrow the gap between research results and field performance.

It would seem that this is mainly an educational task where simple answers are not available. Man's motivation to learn is varied; therefore, our approaches to convey results of research information must also be varied, and we must remember that repetition is paramount in the process of learning or acquiring skills.

We would like to suggest certain approaches that we have used to stimulate the adoption of research information and would like to solicit your comments on successful methods that you have employed.

We are convinced that replicated research trials can serve as excellent extension demonstration plots to show growers, licensed advisors, applicators, and fieldmen. By having them visit the trials and learn to evaluate the results they too can learn the strengths and weaknesses of certain herbicides or techniques of application.

We need to work more closely with and keep informed not only growers but salesmen, agricultural advisors, and most importantly fieldmen of sugar beet processors. They are in daily contact with growers; thus they can be the catalysts between research and field application.

A well informed fieldman and licensed pest control advisor can be the main channel for disseminating information relating to vegetation management. We need to work with them more closely; they outnumber us, they visit a grower's field more often than we can. They are anxious to learn and we should be happy if they become the experts in the eyes of the grower.

We must continually stress that weed control has to be an integral part of the total crop production. It has to be planned well in advance.

We need to utilize the mass media (newspapers, radio, and television) to alert growers to the potential losses they can suffer from weeds infesting their crop, and to stimulate them to plan their weed control program before the weeds become an unmanageable problem.

Research summaries of findings and progress reports should be published not only in technical journals that seldom reach the user, but in popular journals in easily readable language. We should conduct small meetings where production problems are reviewed and where an opportunity can be given for the exchange of information and for questions and answers.

We have an array of herbicides registered for use in sugar beets, but we must stress that only through knowledge of the weed infestation can we select the most effective herbicide to use. Therefore, we need to emphasize the necessity of keeping records of weed infestations.

We need to continually emphasize the importance of accurate application through proper sprayrig calibration, and adjustment of the application and incorporation equipment.

In sugar beets we have a unique opportunity to close the gap between research findings and field performance by working more closely with the fieldmen of the processors.

Processors are doing a good job training their fieldmen but there is room for improvement. We would like to urge processors to utilize their research staffs as well as men in commercial research and those working for public institutions to better train their men in the area of vegetation management.

Most of us learn by doing. Involvement is necessary to build confidence and confidence so gained will make it easier for the fieldmen or advisors to make positive recommendations.

The fieldman should be required to visit every grower's field at regular intervals and submit a report not only to his supervisor but to the grower as well. Remember it is the farmer who grows the beets.

Fieldmen and licensed advisors should be supplied with equipment to put out small demonstration plots in their districts. This would enable them to learn by doing, give them more confidence, learn the susceptibility of weeds to herbicides, and most importantly demonstrate to growers in their district the merits of effective vegetation management.

In conclusion, we in applied research work must continually explore the diverse needs of the beet growers. Our commitment must be strong enough to bring about changes in management practices that will close the gap between research results and field performance in the area of vegetation management.