

# Chemigation Application of Kerb on Lettuce

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## Introduction

The story is that the idea to apply herbicides in irrigation water was developed by two drunken pest control advisors as they stood before the urinals in the men's room after drinking beer all night. Eptam was the first herbicide that included chemigation on the label. This occurred in the early 1960s and several chemigation applications have been registered since that time. Although there are times when it has seemed like an idea that was developed by a couple of drunks, in most cases it has offered growers a convenient and effective alternative to apply pesticides.

The recent special local need registration for the chemigation of Kerb in lettuce has created much interest and many questions about this technique. This brief article is intended to help answer some of those questions.

## Rationale

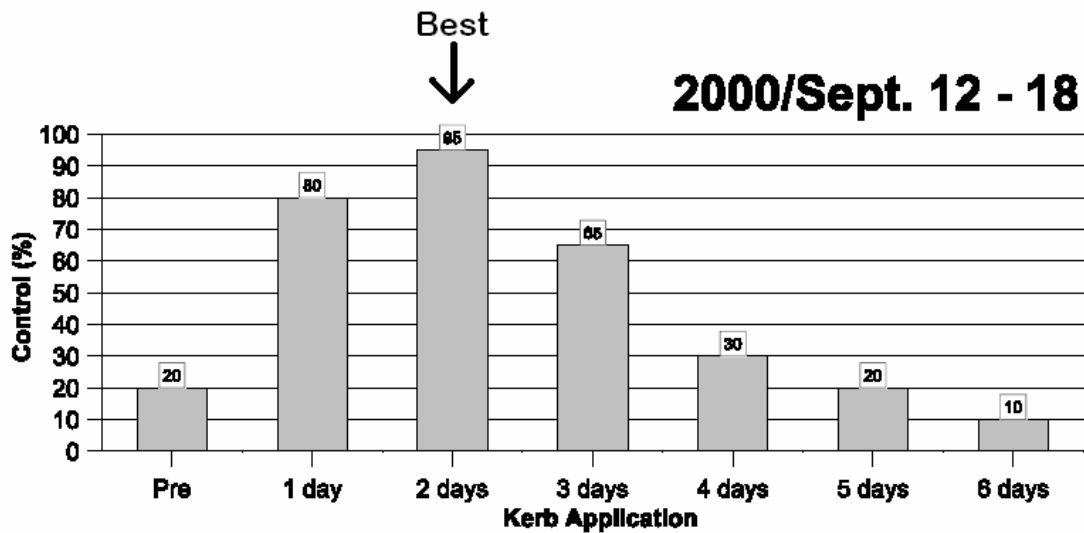
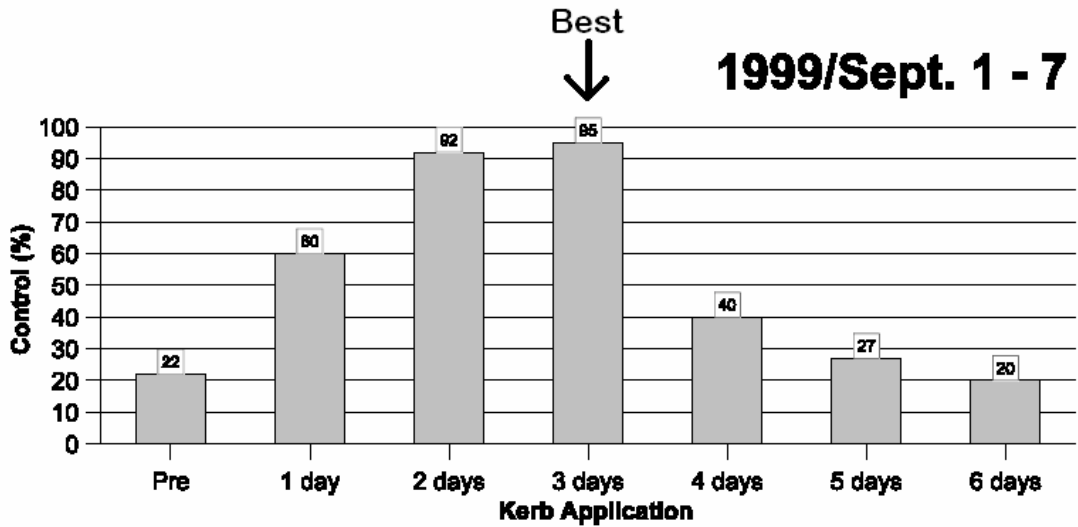
Kerb was first registered in 1969. Most of the use on lettuce, until the mid 1980s, was as a post-plant, preemergence treatment incorporated with furrow irrigation. From the mid 1980s until present, sprinkler irrigation to establish the crop has become increasingly widespread. When furrow irrigation is used, Kerb is held on the bed top where it is needed. When sprinklers are used and much water is applied prior to weed germination, the herbicide is pushed too deep and is ineffective. This problem has been overcome by delaying Kerb applications until just before weed seeds germinate. In most cases, delayed applications cannot be made by ground due to wet fields and aerial applications have been made. Aerial applications cannot be as precise as ground applications and overlaps and skips have sometimes occurred. Our tests and grower experience during the 2002-03 season indicated that making delayed application of Kerb through the sprinklers is often as effective and often more effective than aerial applications. The Western Growers Association applied for and was granted a special local need registration for the chemigation of Kerb to lettuce in July 2003. This 24C registration may be used only by members of Western Growers who have contracted with them for this use and signed a waiver of liability.

## Timing and Rate

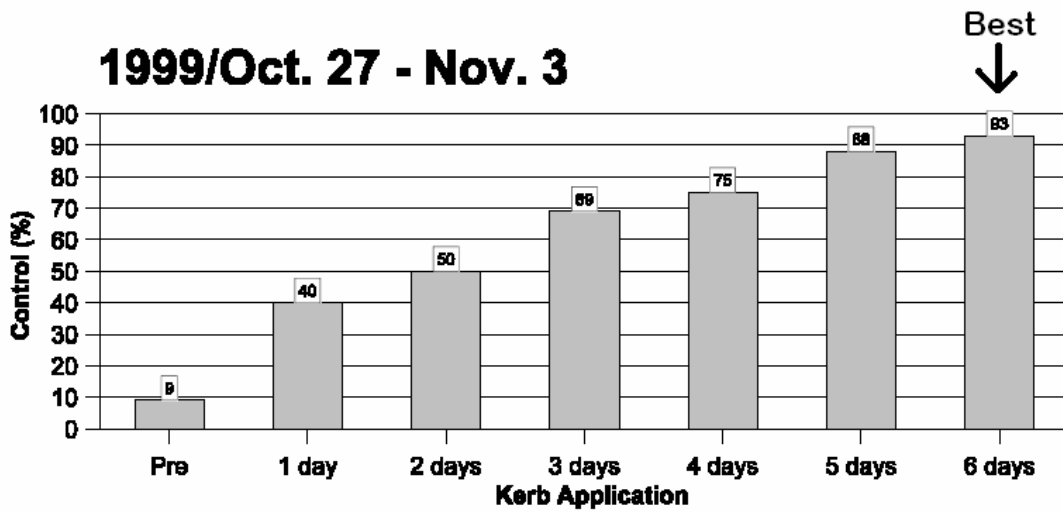
The correct timing of application is critical to the success of delayed application of Kerb and failures are more likely to occur from incorrect timing than poor applications. The correct time of application is just before weed seed germination and this will change depending upon season, weed species and environmental conditions. Typical weed germination times after moisture is present are:

<u>Weed</u>	<u>Days to Germination</u>
Summer annual grasses	0.5 - 1
Pigweed	2 - 4
Purslane	1 - 7
Winter Annual Grasses	3 - 7
Lambsquarter/Goosefoot	3 - 7
Shepardspurse/London Rocket	4 - 7
Nightshade	3 - 5

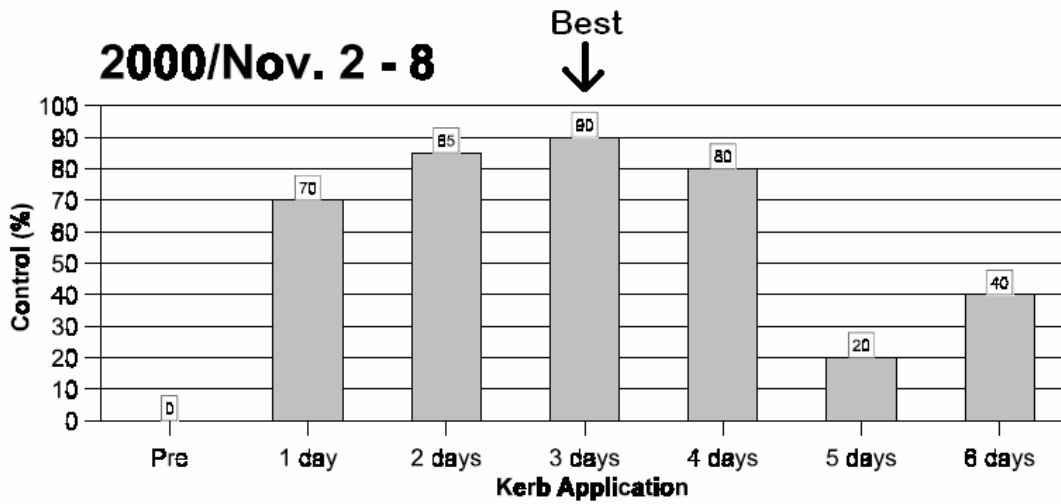
These germination times will vary however depending upon soil temperature and season. Purslane, for instance, will germinate in 24 hours in August. It will still germinate in January but it will take 5 to 7 days at that time. All of these variables make it difficult to time Kerb applications. The following graphs from our tests illustrate this difficulty.

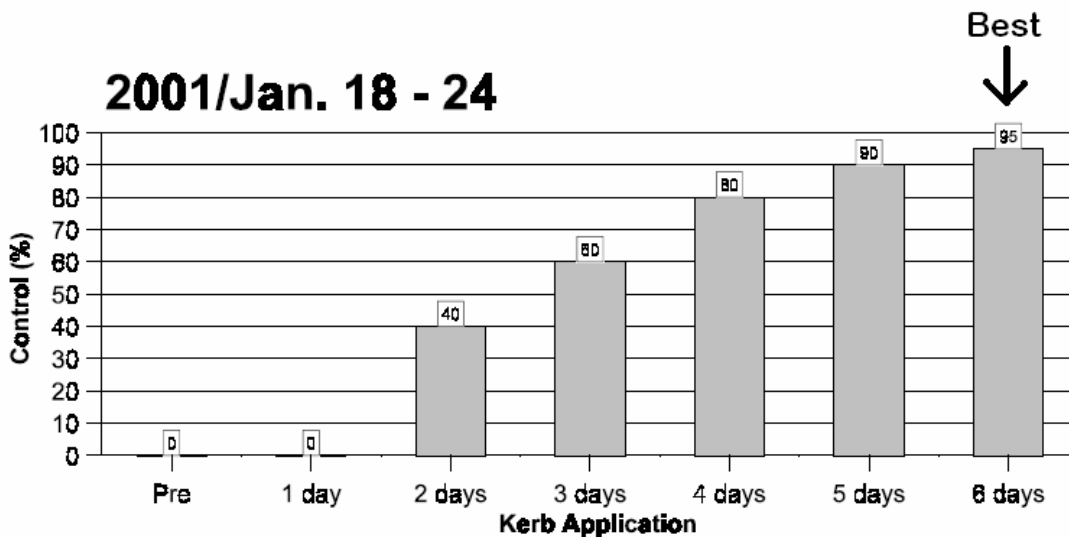


### 1999/Oct. 27 - Nov. 3



### 2000/Nov. 2 - 8





In 1999, the best early season application was 3 days after the sprinklers were started. The following year, the best time was 2 days after the sprinklers were started and dropped by 30 % if you had waited until day 3. The mid-season test results varied even more. In 1999, the best control was achieved 6 days after the sprinklers were started. In 2000, the best control was after 3 days and had dropped by 50% by day 6. In late season (January), it can take a week or more for weed seeds to germinate. Kerb applications are easily made too early at this time. Test results from only one test illustrate that control was best 6 days after the sprinklers were started. The general guidelines that appear on the supplemental label are:

<u>Timing</u>	<u>Date</u>	<u>Application Timing</u> (days after starting sprinklers)
Early	Sept. 1 to Oct. 15	1 - 3
Mid	Oct. 15 to Dec. 15	3 - 6
Late	Dec. 15 to Jan	5 - 6

Time of application should be adjusted when conditions, mainly soil temperatures, are favorable for weed seed germination. For instance, if temperatures have been warmer than normal in November, it would be best to aim for 3 days after starting sprinklers and if conditions have been cold, 6 days might be better.

The normal application rates for Kerb are 2 to 4 lbs. per acre. At these higher rates, if 50% of the herbicide is leached below weed seeds, it still leaves enough to control some of the most sensitive species such as grasses. It is not uncommon, however, to miss even these sensitive weeds when Kerb is applied before starting sprinklers and they are run for 6 or 7 days before seeds germinate during mid and late season applications.

Delayed applications help avoid leaching of the herbicide and the 2 to 4 lbs. Per acre rate is not needed and can cause crop injury. In practice, half of the original labeled rates have been effective and helped avoid crop injury. The supplemental label for chemigation recommends 1 to 2 lbs. per acre depending upon soil type, weed species and level of infestation.

### **Procedure and Equipment**

In theory, irrigation management can be highly technical. In practice, it involves common sense and experience more than anything else. Chemigation involves using systems that were designed to deliver water to apply

pesticides. In general, these systems lack the precise nozzles, spacing, pressure and speed that are contained in spray equipment. It is not possible to always avoid the problems inherent in using irrigation systems to apply pesticides although experience has shown that chemigation can be effective.

Mixing: Kerb is a water-soluble powder that requires continuous agitation. Even with continuous agitation it is difficult to keep all of the product in suspension when flat bottom tanks are used and there is little water left toward the end of the application. Adjuvants are available that help keep the product in suspension although the effect of these products on crop safety and weed control have not yet been established. The label suggests a minimum of 3 gallons of water per pound of Kerb.

Time to Apply: No research data is available to help establish the amount of time it should take to apply Kerb through sprinklers. It is reasonable to assume that if the application is done too quickly that the product will not be applied uniformly. On the other hand, if too much time is taken, it increases the exposure to environmental and other factors that affect uniformity. The label suggests 1 to 2 hours for injection and a rule of thumb has been that it should take 1.5 hours to treat 35 acres.

Enough water should be applied after injection to incorporate the herbicide but not too much to push the herbicide below the weed seeds. It takes approximately 1/2 inch of water to incorporate the herbicide. Most systems apply approximately 1/10 inch of water per hour. The system should be run, therefore, for at least 5 hours after the Kerb has been injected for incorporation and to flush the system. Running the system for significantly longer than this could leach the herbicide.

System requirements: The label requires the following equipment:

- Check valve
- Vacuum relief valve
- Low pressure drain
- Automatic quick closing check valve
- Solenoid-operated valve on the intake side of the injection pump
- Interlocking controls automatically shut off the injection pump when the water pump stops
- Pressure switch to stop the water pump when water pressure decreases
- Metering pump such as a positive displacement injection pump

All of this is designed to replace someone who continuously monitors the system during Kerb injection who can shut the injection down if problems occur. It is to safeguard against the possibility of Kerb going somewhere other than the field and against the wrong rate being applied. These requirements are similar to those appearing on many chemigation labels. They are a legal requirement and applicators can be cited if they are not in compliance.