

Kochia Biology and Control

Bruce Murray, Weed Specialist, Soils and Crops Branch, Manitoba Agriculture, Food and Rural Initiatives, Carman, MB., R0G 0J0
E-mail:brummurray@gov.mb.ca

Over the past few years producers and agronomists have noted that kochia populations have been increasing in the province. A better understanding of the basic biology of kochia, our soils and the ag-climate is needed to explain this increase, and to plan control strategies.

Kochia is an annual weed, reproducing by seed only. A single plant can produce over 16,000 seeds. Seeds are dispersed by wind (tumbleweed) and are short lived. This low level of seed dormancy (short lived) is a benefit to producers. Given proper control strategies kochia populations can be eradicated in a relatively short period of time.

Seeds germinate early in the spring. Seedlings emergence shortly after the last frosts and are easy to identify. Cotyledons are bright pink on their undersides and the first true leaves are hairy. The seedlings are quick to develop; coupled with their early emergence this makes it difficult to correctly time herbicide applications. The pubescent nature of this plant makes it difficult to get good herbicide coverage. It is important that an adjuvant is included in the spray mixture if required (refer to product label).

Seedlings are not competitive, and require a "break" to get established. This weed takes advantage of a number of different types of situations to become successful. Kochia is tolerant of high levels of soil salinity. This weed will germinate and mature under salinity conditions that most plants would not survive. Kochia is also drought tolerant. Kochia will remain green and grow under extremely low soil moisture conditions. Kochia will also take advantage of environments that offer low competition. These include crops like beans and flax, as well growing in areas void of plants (ditches, rail lines, road sides, and yard sites). As mentioned above, kochia will establish early in the spring before crop emergence. This is another mechanism used by kochia to avoid competition during the seedling stage.

Mature plants are large, erect and covered by many bright-green, narrow leaves. Kochia flowers are small and inconspicuous. Mature plants are very competitive and once established are very hard to control. Weed densities of 21 plants per m² have caused yield losses in wheat of approximately 33 percent, while extreme infestations of 195 plants per m² have reduced wheat yields by 73 percent.

From 1997-2002 kochia became more abundant in Manitoba fields. In 1997 kochia ranked as the 23rd most abundant weed in the province, in 2002 it was 16th. The frequency of fields infested with kochia increased from 7.7% in 1997 to 8.6% in 2002. In addition the density of plants in infested fields increased from an average of 4.4/m² to 6.2/m² over the same period of time. The highest instances of kochia were found in the southwest and west-lake regions of the province (See Figure 1 - 2002 weed survey Thomas et al).

There are a number of control options available for this weed. Before control strategies are undertaken, you should determine why the patch exists. Are you dealing with a saline area, has it been dry, or has the kochia been able to take advantage of a non-competitive situation. Has the weed blown in from an adjacent area (old yard site, railway track, ditch etc.)?

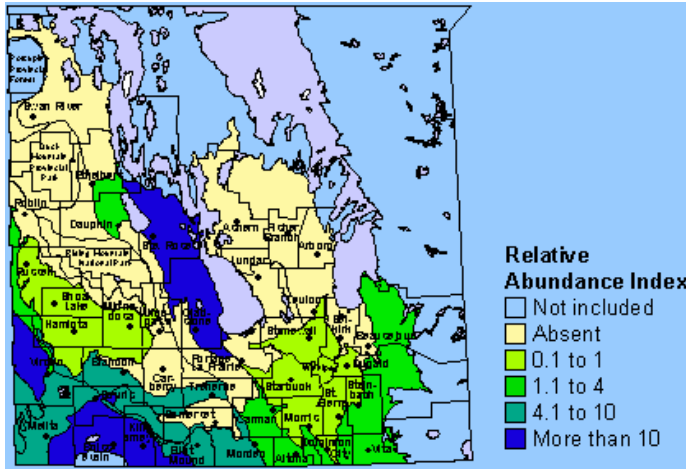


Figure 1. 2002 Weed Survey, Thomas et al)

Fields need to be scouted early in the season. Pre-seed tillage, or herbicide burn-downs are good control strategies for existing populations. If the patch is in a highly saline area it is advisable to plant a salt tolerant species. There are no good annual crop species available for this situation, and therefore you may want to use a tolerant perennial forage (tall wheatgrass, Russian wild rye, slender wheatgrass). If the salinity is moderate, you will want to plant a competitive crop species. Wheat, oat, barley and canola are good options. A winter cereal has an excellent fit in this situation, giving good early season competition, with a variety of herbicide options if needed. Avoid planting uncompetitive crops such as flax, and beans. These species have limited herbicide options and are poor competitors. Pulse crops do not grow well on moderately saline soils adding to their non-competitive nature.

Determine where the kochia seed source is, this weed often blows in. Scout adjoining areas, such as neighboring fields, ditches, yard sites, and railways. Once the source is determined you can begin controlling it.

There are a number of reasons we could see even more kochia in 2004. Areas affected by soil salinity are potentially expanding. Riding Mountain has soils that are considered at risk for increasing salinity. We have also had one or two years of dry conditions in various regions of the province (See Fig. 2).

Kochia populations often increase significantly following dry years. And finally, we have seen a large increase in the number of acres of pulse crops, particularly dry beans and soybeans. These pulses are poor competitors, do not grow well on moderately saline soils and have few good herbicide options available for in crop control of kochia. Therefore bean acres often offer an opportunity for kochia to establish and set seed.

One additional fact may be contributing to the apparent increase in kochia populations. Throughout the globe there have been many documented instances of kochia becoming resistant to group 2 herbicides. It is suspected that there are a number of group 2 resistant populations in Manitoba, particularly in the Southwest region. If resistance does exist, many effective herbicides would not be available to control this weed.

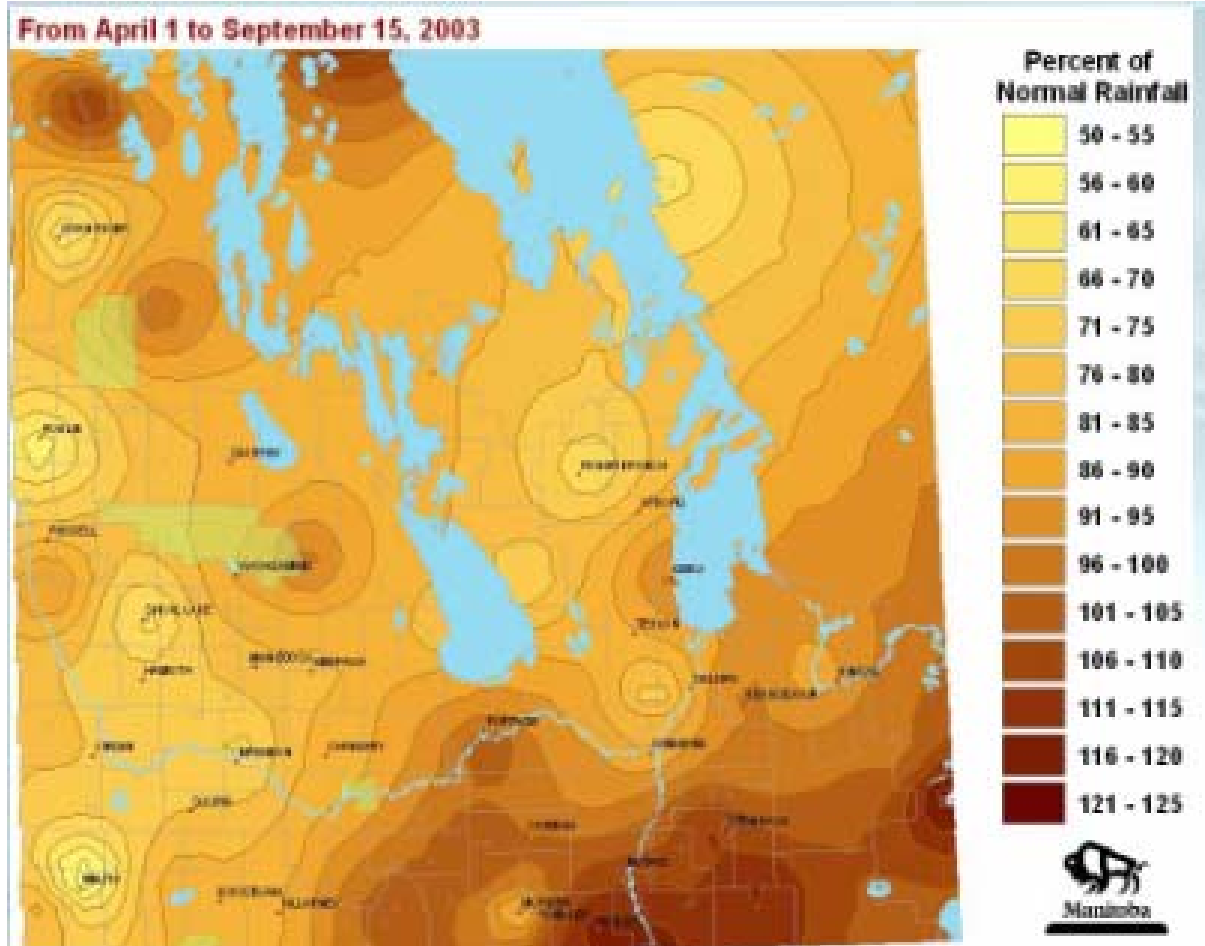


Figure 2.