

Chemical Farming implies the use of chemicals for the control of insects, weeds and diseases. In this paper, I want to deal with the use of herbicides in cotton that can be used with, or as a substitute mechanical cultivation. I also want to consider how old products can be used more effectively and how new ones provide more flexibility in operations. Whilst new opportunities can be provided with new chemicals, some opportunities have been lost with the old ones. Whenever a natural Ecosystem is converted to an artificial farming system amongst other things, weeds become a major problem, even to the point where financial viability is threatened.

By definition, a weed is an unwanted plant or a plant out of place. This includes the residue of previous crops such as sunflower, wheat and sorghum. Once given the chance, weeds are relentless in their quest to dominate our farmland and only good management and good cropping systems can prevent this from happening. The spectrum and density of any weed population is constantly changing as certain species dominate from time to time. Farming practices largely influence this situation.

Initially, the problem may come from:

1. A resident population in place when farming begins
2. The residue of a previous crop in the rotation system
3. Seeds introduced by irrigation water or intermittent flooding. In cotton farming, this is the biggest single source of weed infestation
4. Poor farm hygiene, e.g. lack of general and crop weed control

A cotton monoculture is most likely to create a severe weed problem within the crop simply because the right environment is created for summer weeds to propagate. The best example of this is nutgrass and, to a lesser extent Barnyard grass, burrs, Sesbania, etc. In more than 20 years of cotton growing, I have yet to see a weed problem that can't be satisfactorily controlled by a combination of crop rotation, the right chemical and proper application technique.

Consider these basic cultural factors in overcoming a weed problem in cotton:

1. Crop Rotation - the right combination of crops with alternating winter and summer fallows. A cotton/wheat rotation is probably the best, but others can work satisfactorily.
2. Take advantage of pre emergent herbicides with good residual life.
3. Select herbicide types individually or in combination to cover the weed spectrum. Understand the mode of action of the chemical.
4. Pre-irrigate if possible for a weed germination before planting.
5. Use layby treatments of residual herbicides at the time of last inter-row cultivation.
6. Calibrate for the correct rate and use the correct application technique.

Often herbicides are regarded as being unreliable or giving poor results. The fault is mostly with the rate and field conditions under which the product is expected to work. It is most interesting to note that our most used and useful herbicides have been around

for a long time - some as long as 25 years, and the cost of these products has come down or at least not risen much in price e.g. Trifuralin, Diuron, Fluometron. As the cost of fuel, labour, equipment R. & M. and depreciation have risen, it is possible to consider herbicides as a substitute for mechanical cultivation. In recent times, new types of herbicides such as Dual, which give more flexibility in the way they are used, have been introduced. Likewise, knockdown herbicides have become more efficient, e.g. Roundup and combinations.

What is the Cost of Weeds?

Last year on "Midkin" we spent \$103/ha on herbicides alone, (\$81 on residual, \$22 on knockdown). This high cost reflects a lot of fallow country.

The comparative analysis of farm costs done by Michael Boyce & Co show an average cost of \$74/ha for herbicides with a high of \$121/ha. I presume this is mostly back to back cotton.

Add to this the cost of chipping at an average of \$50/ha with a high of \$103/ha. Chemicals for general weed control will cost approx. \$12/ha for the farm.

To add these direct costs for the whole cotton industry:

Chemicals alone	>	\$20M
Chipping	>	\$10M
Application	>	\$ 4M
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		\$34M

Plus the unspecified cost of -

- A rotation system (Lower profit crops)
- Lost moisture and nutrition (yield)

- Disease (*Verticillium* wilt)
- Yield and quality loss (lower income)
- Soil compaction from ground working (lower yield)
- Ginning problems (lower lint out turn and seed value)

In a presentation like this, it is impossible to cover every weed problem and herbicide solution, however, there are some specific issues I want to address. These are new opportunities with old and new chemicals.

1. If you have a long fallow before cotton, consider using Trifluralin at 4 to 5 l/ha as early as March. It will control weeds through the winter and summer. This can give you 6 months control for only \$20/ha (equal to slightly more than 1 working).
2. Diuron at high rates can also be used in the same way - 4 kg/ha AI. (This is equal to about 2 row crop workings.)
3. It may still be necessary to use a knockdown mid winter to get rid of escapes but the pressure is considerably less and the fallow should remain weed free after that. There is a wide range of products for this purpose e.g., Roundup, Hormone sprays, Paraquat, Diquat, etc.
4. Dual is a good product to use as a Trifluralin substitute if you are watering the crop up. Stomp also fits into this situation. Mechanical incorporation is not essential.
5. Experiment with shallow but thorough incorporation of Trifluralin. Recent information suggests that it doesn't need to be incorporated as deeply as first thought, and is shoot absorbed.

6. Consider the use of Prometryn as a layby treatment either alone or in combination with Diuron or Cotoran (Cotogard). It has a short residual life, is very active, and won't hurt established cotton. The main disadvantage is its cost. If Prometryn was cheaper it would also have a place in fallow weed control.

Looking at some typical herbicide strategies that have been used in recent times on "Midkin".

Wheat Fallow Cotton

Operation	Time	Herbicide	Rate/HA	Approx Cost
Seed Bed Prep	Feb/Mar	Trifluralin	5 l/ha	\$32.50
Air Spray	June	Roundup 24D	1 lt) 1.4 lt)	\$22.00
		+ application		\$ 7.00
Pre plant incorp	Sept	Cotoran	3 lt	\$36.00
Band planter	Oct	Cotoran (Diuron)	1 lt	\$12.00
Layby	Dec	Diuron (Cotogard/ Prometryn)	2.5 lt	\$16.00
				\$125.50

Cotton to Cotton

Operation	Time	Herbicide	Rate/Ha	Approx. Cost
Plant/waterup	Oct	Dual	3 lt	\$48.00
		Cotoran (Diuron/Cotogard)	3 lt	\$36.00
Layby	Dec	Diuron (Cotogard/ Prometryn)	3 lt	\$20.00
				\$104.00

1/3 Band of Dual reduces costs to \$70.40

Cotton to Cotton

Operation	Time	Herbicide	Rate/Ha	Approx Cost
Pre plant incorp SBP	Aug/Sept	Trifluralin	2.8 lt	\$30.00
Pre-planting incorp	Sept	Diuron WP	2 kg	\$16.00
Planting bank	Oct	Fluometron	$\frac{1}{2}$ kg	\$ 8.00
Layby	Dec	Diuron WP	1 $\frac{1}{2}$ kg	\$12.00
				\$66.00

You can see from these examples that cost is influenced by cropping programme, product type, formulation and rate. The cheapest product and formulation may not be suited to every situation. A product like Stomp or Dual is more expensive but does not need mechanical incorporation. A seed bed may be just too rough to incorporate Trifluralin and so on.

Before you make a weed control decision, compare the cost/benefit of a chemical with mechanical tillage. The opportunities may be more rewarding than you think.

