

## FRINGE BENEFITS OF WEED CONTROL

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Most authorities on the subject list the benefits of weed control as the elimination of competition with the desired crop. Weeds compete with crop plants for water, nutrients, light, and space. Crop yields are often reduced. In alfalfa harvested for forage, yields are not always reduced by weed competition, in fact, they may sometimes be increased because of the added volume of weeds in the hay. Benton (1) found that on his irrigated alfalfa herbicide trial hay yields were reduced by effective weed control but that weeds were largely responsible for the difference.

Table 1. The effect of herbicides on yield of alfalfa at Big Springs, CA 1971

<u>Treatment</u>	<u>Yield per plot in lbs.</u>	<u>% Weeds</u>
None	40.1	64
Simazine	32.2	23
Sumitol	32.4	28
Kerb	45.8	80*

\*Weeds were primarily established and were species resistant to Kerb.

In a field of this kind, however, weed volume exceeded that of the alfalfa and would make marketing of the product difficult.

I shall attempt in this paper to point out the "fringe benefits" of weed control in alfalfa, or in other words try to make a case for good weed control practices. By fringe benefits, I mean those minor and sometimes obscure benefits not often talked about. The items to be considered as fringe benefits are: Aesthetics, weed control in subsequent crops, reduction of insects and diseases, harvest costs, stand longevity, and feed value.

### Aesthetics

Someone has said, "A thing of beauty is a joy forever." There is nothing more beautiful than a vigorous, thick stand of weed free alfalfa in the pre-bud stage. No grower takes pride in having the weediest alfalfa field in his neighborhood. On the contrary, neighbors are quick to compliment any grower who has a fabulous alfalfa field that is vigorous, productive, and weed free. Peace of mind is worth considerable as contrasted with the weedy field which generates worry, disgust, and the "gasid" upset stomach.

### Weed Control in Subsequent Crops

Numerous investigators have attempted to determine the numbers of seeds produced by various weedy plants. The following table extracted from Stevens (7) lists a few of the more common weeds. I have purposely lifted weeds from his list which are commonly found in our irrigated areas.

Table 2 The number and weight of seeds of some weedy plants

Weed		No. of seeds produced per plant	Weight of 1,000 seeds in grams
Purslane	<u>Portulaca oleracea</u>	52,300	.130
Shepherd's purse	<u>Capsella bursa-pastoris</u>	38,500	.096
Wild lettuce	<u>Lactuea scariola</u>	27,900	.450
Rough pigweed	<u>Amaranthus retroflexus</u>	117,400	.380
Lambsquarters	<u>Chenopodium album</u>	72,450	.700
Yellow nutgrass	<u>Cyperus esculentus</u>	2,420	.190
Barnyardgrass	<u>Echinochloa crusgalli</u>	7,160	1.400
Sandbur	<u>Cenchrus pauciflorus</u>	1,110	6.750
Wild oat	<u>Avena fatua</u>	250	17.520
Common knotweed	<u>Polygonum aviculare</u>	6,380	.675

It is apparent from the above table that pigweed and lambsquarters are capable of producing enough seeds on a single plant to infest an acre of land; 1.7 seeds per square foot for lambsquarters and 2.7 seeds per square foot for pigweed.

The number of seeds produced by weeds is not the most distressing issue. Weed seeds seem to be able to survive forever in the soil. Darlington (3) reported on an experiment wherein weed seeds had been placed in the soil at a depth of 2 feet and later taken out for germination studies. After 40 years, seeds of rough pigweed, lambsquarters, curly dock, purslane, and tumbling pigweed still germinated. Shepherd's purse germinated after 35 years, and common mallow after 20 years. Weeds should never be permitted to go to seed.

Another study by Harmon and Keim (4) involved the cycling of weed seeds through different farm animals to determine the effects of digestion on germination. Some of their findings are summarized in the following table.

Table 3. Percentage of weed seeds recovered in the feces of farm animals.

Weed	Percent recovered by kind of animal				
	Calves	Horses	Sheep	Hogs	Chickens
Perennial morning-glory	38.7	10.4	15.4	51.2	0
White sweet clover	16.6	19.1	8.2	31.1	0
Smartweed	26.4	22.2	8.4	7.1	0

They also found that after the weed seeds were recovered and acid treated, on the average 41 to 60 percent of the morning-glory seeds germinated, 52 to 82 percent of the white sweet clover seeds, and 0 to 27 percent of the smartweed seeds germinated, depending upon the animal species from which they were recovered.

From the data on numbers of seeds produced and their longevity in soil and livestock, it is evident that weeds should never be permitted to go to seed. One might argue that once he has weeds that it is useless then to try to control them. This is not so. Each effort to control weeds reduces the problem in size.

#### Weeds Harbor Insects and Diseases

Muenschler (6) reported that by controlling weeds we may minimize the spread of insects and diseases. Among the diseases he associated with weeds were cucumber and tomato mosaics carried in the common groundcherry. Lambsquarters and goosefoot harbored the common stalk borer of tomato and corn. Pigweed was the host of the tarnished plant bug. In our area it is common knowledge that wild beets host the sugar beet leafhopper and also the curly top virus of sugar beets.

#### Harvest Costs

An often overlooked loss from weedy alfalfa is the increased cost of harvesting. I have seen the entire first cutting lost due to heavy weed infestations. Not only did the grower lose his first cutting, but he had the cost of removal of the weeds before he could

get a second cutting. In another case I observed, the weeds were swathed then chopped and distributed by the wind to create trash in the next cutting and assure a weed seed supply for the next year.

Less spectacular losses may occur from grassy infestations. Most sickle-bars have difficulty in heavy grassy fields. The cut is not as clean, it requires a better knife, and curing in the swath is not as rapid. This results in a small percentage loss by impaired cutting and also a loss of time. Heavy grass infestations also make cubing more difficult if that is the method of processing.

Other considerations of increased harvesting costs due to weedy hay are hauling and packaging costs. If weeds make up from 5 to 20 percent of the volume or weight of hay, then they require 5 to 20 percent more wire to bale and 5 to 20 percent more space to haul and handling costs. They've got to be good saleable weeds before they are profitable.

#### Stand Longevity

Since weeds harbor insects and diseases and occupy space, their control can often extend the productive life of an alfalfa stand by as much as a year or two. Alfalfa plants do better because of the lack of weed competition.

The saving of a year in stand life may be quite significant. If we use the Imperial County sample production costs for alfalfa for 1973, we find the cost of establishing an alfalfa stand, less weed control costs, is \$94.75 per acre. Amortized over a 3-year stand life it amounts to \$31.58 per acre per year. If the stand life can be extended, through weed control to 4 years, the yearly cost of stand establishment is but \$23.69 per acre. This saving plus an extra year of hay is good business if the stand is still productive.

#### Feed Value

The feeding value of hay is often obscured by the market value of hay when it comes to the benefits of weed control. I have heard some dairymen boldly state "my cows milk better" on weeds than they do on straight alfalfa. The weeds in these cases were chickweed and dwarf nettle. I have my doubts as to the soundness of their observations.

Nettles, pigweeds, goosefoot, mustards, some of the composite-type weeds, and nightshades are known accumulators of nitrates, Kingsbury (5). Plants containing more than 1.5 percent nitrate as  $KNO_3$  by dry weight may be lethal to ruminants. Sub-lethal nitrate poisoning can occur by ingestion of feed containing .5 to 1.5 percent nitrate. Sub-lethal nitrate poisoning may be characterized by abortion, depression of milk production, discolored urine, some digestive disturbance, symptoms of vitamin A deficiency, and hypothyroidism.

Weeds which accumulate another group of toxins, the oxalates, are purslane, beets, docks, and oxalis according to Kingsbury (5). Oxalates interfere with calcium absorption in the diet. Of the weeds mentioned, we have wild beets, purslane and dock.

Some other weeds which are known to contain toxic levels of alkaloids are heliotrope, groundsel and nightshades, (Kingsbury). These weeds are not common problem weeds in alfalfa in our area, but one, groundsel, is spreading this way. It is becoming a real problem as near as Antelope Valley. The alkaloids from these plants generally cause liver damage or damage to the central nervous system.

In addition to toxins from weeds, few weeds are as nutritious as alfalfa. Most weeds reduce feeding value of alfalfa hay by either increasing the fiber or decreasing the protein or both. In the state of Nevada, hay is bought on a basis of protein content. Hay, according to Cords (2) with 21 percent protein is rated at 100 percent value. Fifteen percent protein hay is worth only 79 percent of the value of 21 percent protein hay. Heavy infestations of flixweed and foxtail barley reduced the protein content of hay to 9 percent which was valued at only 53 percent of clean hay.

In California, where marketing standards are based somewhat on modified crude fiber content, each increase of 1 percent in modified crude fiber essentially drops the market value by \$2.00 per ton based on current prices. Weeds can and do tend to affect the modified crude fiber content as well as protein in hay. A preliminary study we have at Riverside indicates that weed-free first cutting hay is 2 percent lower in fiber than weedy hay. This would be about \$4.00 per ton for the cost of weeds:

In summary, weeds are costly. It costs to control them. The little items of cost, the "fringe benefits" of weed control, should all be looked at critically. The costs of weed control should be amortized over a number of years for as Dave Cudney has said, "One year's seeding, means seven years weeding."

#### Literature Cited

- Benton, R. W. Alfalfa Weed Control. Personal communication, Siskiyou Co., Calif. 1971.
2. Cords, H. P. Weeds and Alfalfa Hay Quality. Univ. of Nevada Resource Information Series, 71-11.
  3. Darlington, H. T. Dr. Beal's Seed-viability Experiment. Amer. Jour. Bot 9:266-269. 1922.
  4. Harmon, G. W. and F. D. Keim. The Percentage of Weed Seeds Recovered in Feces of Farm Animals and Their Longevity When Buried in Manure. Jour. Amer. Soc. Agron., 26:762-767. 1934.
  5. Kingsbury, J. M. Poisonous Plants of the United States and Canada. Prentice-Hall, Inc., New Jersey. 1964.
  6. Muenscher, W. C. Weeds. 2nd Ed. The Macmillan Co., N.Y. 1955
  7. Stevens, O. A. The Number and Weight of Seeds Produced by Weeds. Amer. Journ. Bot., 19:784-794. 1932.