

THE RELATIONSHIP OF ALFALFA STAND TO WEEDS

Carl E. Bell, Farm Advisor, Imperial County
University of California, Cooperative Extension

In modern agriculture, weed control and herbicides are usually considered synonymous. This attitude causes growers and pest control advisers to forget how good many crops are at keeping weeds suppressed. Alfalfa is one of the best examples of a competitive crop.

In an ecological sense, alfalfa has every reason to be a good competitor. Alfalfa is an example of a plant that can withstand regular foraging by grazing animals. These types of plants, which we call forage plants, have several features in common. One feature is having regrowth buds located at the base of the plant, near the soil. Another feature is a deep root system that stores carbohydrates. A third feature is rapid regrowth after being eaten. Foraging by animals creates a disturbance in the ecosystem that could result in invasion by other plants. The ability of forage plants to quickly recapture their space after being eaten is why they survive and prosper in this type of environment.

The alfalfa ecosystem that we farm has some similarities and some differences from the natural ecosystem where alfalfa evolved. The physical attributes of soil and climate are essentially the same. We have substituted mechanical mowing for grazing (some grazing is still practiced). The effect on individual plants from mowing or grazing is equal, the difference for a field is that grazing is slow and random while mowing cuts the whole field in a short period of time. The plants are all the same age, except for some areas of the field that may be replanted. In a natural system, there is a constant cycle of death of old plants and germination of new plants. We only have one species (really only one variety) in our system. Other plants are considered undesirable (we call them weeds). Natural systems are a mixture of many species of plants. We also supply water to alfalfa crops by irrigation. The most important difference between a natural forage ecosystem and an alfalfa field is human management. We decide when the harvest will take place, how frequently it is done and when water is supplied to the system.

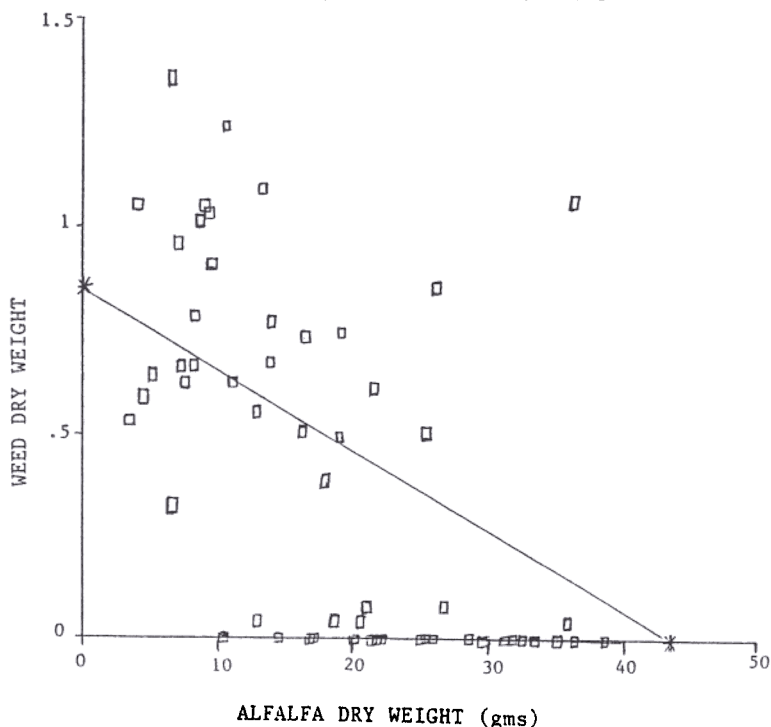
When managed properly, alfalfa will prevent weeds from invading its ecosystem. Bill Lehman, alfalfa breeder at the Imperial Valley Agricultural Center, Vern Marble, and Robert Hagemann alfalfa agronomists for Cooperative Extension and Robert Norris, botanist at U.C. Davis have all reported on the relationship of alfalfa stand management and weeds (1,2,3). In general, they conclude that the cutting schedule has to be long enough (28 days or longer) to allow the alfalfa plants to replenish carbohydrates taken from the roots. They also have observed the relationship of irrigation practice to weeds. Irrigation has to be delayed after harvest until regrowth begins from the alfalfa crowns. Watering too soon will increase injury from root rots and scald and also encourage weed germination.

This past spring, I made some regular observations of three alfalfa fields in the Imperial Valley. The goal of these observations was to see if a correlation could be measured between alfalfa and weeds that would predict weed levels in the alfalfa. In general, the results support the conclusions of Lehman, Hagemann, Marble and Norris. Measurements commenced in March and

continued through July. Twenty 1/4 square meter samples were taken three times during each cutting. Sampling days were the day of the first irrigation after harvest, 10 days later, and 16 days later. Each sample included; the number of crowns, number of stems, height, and dry weight of alfalfa in addition to number of weeds. In July, the weight of the weeds were also recorded because they were large enough to be in the alfalfa harvest. Before July, the weeds were all shorter than the cutter bar of the alfalfa mower. In July, there was an inverse relationship between the weight of the weeds and the weight of the alfalfa. An old principle of weed science is that a piece of land is capable of producing only so much biomass. That biomass can be crop, weeds or a combination of the two. The data collected, and the correlation shown in Figure 1, support this principle. The correlation is evident, but not real strong in a statistical sense. The reason for the lack of strength is; that alfalfa is a legume and competes differently then other plants because it produces its own nitrogen, these data are from real fields with a lot of variability, and the weeds were not completely mature at the July harvest. There was NO correlation at all between the alfalfa and the number of weeds. A strong alfalfa stand will not stop weeds from germinating, but it is important in preventing these weeds from growing.

Figure 1

Relation of alfalfa to weeds

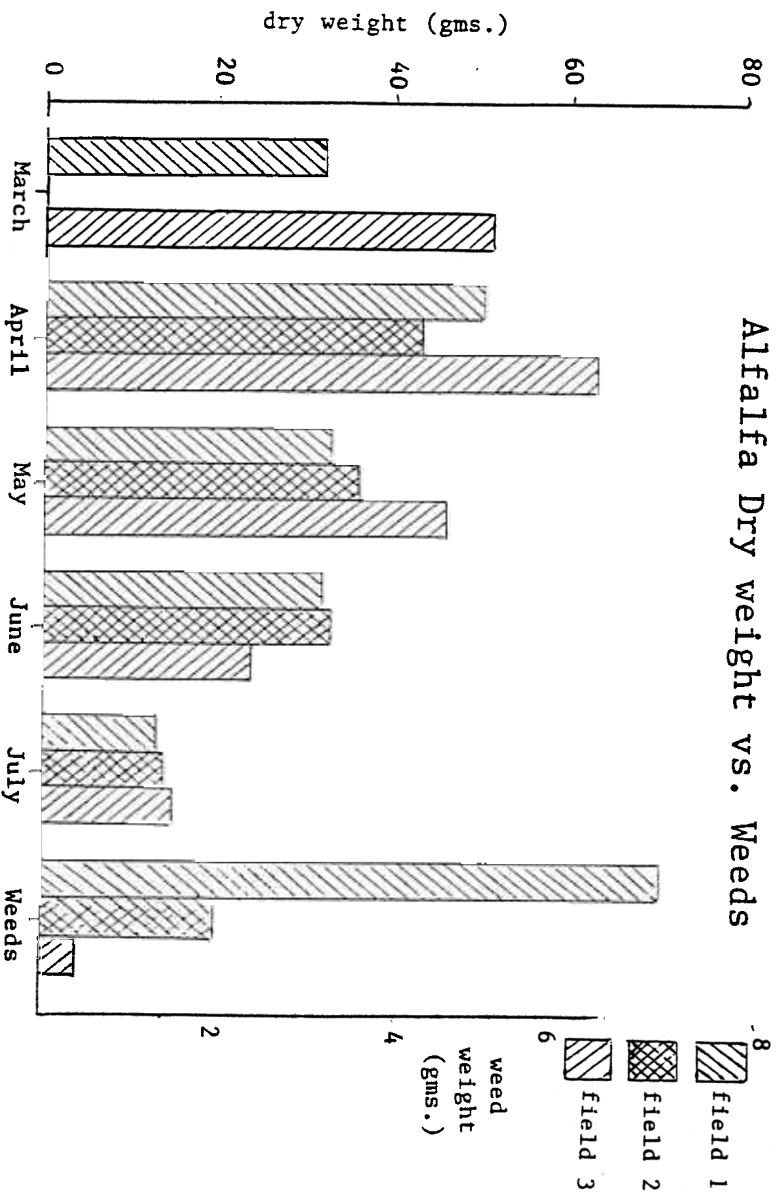


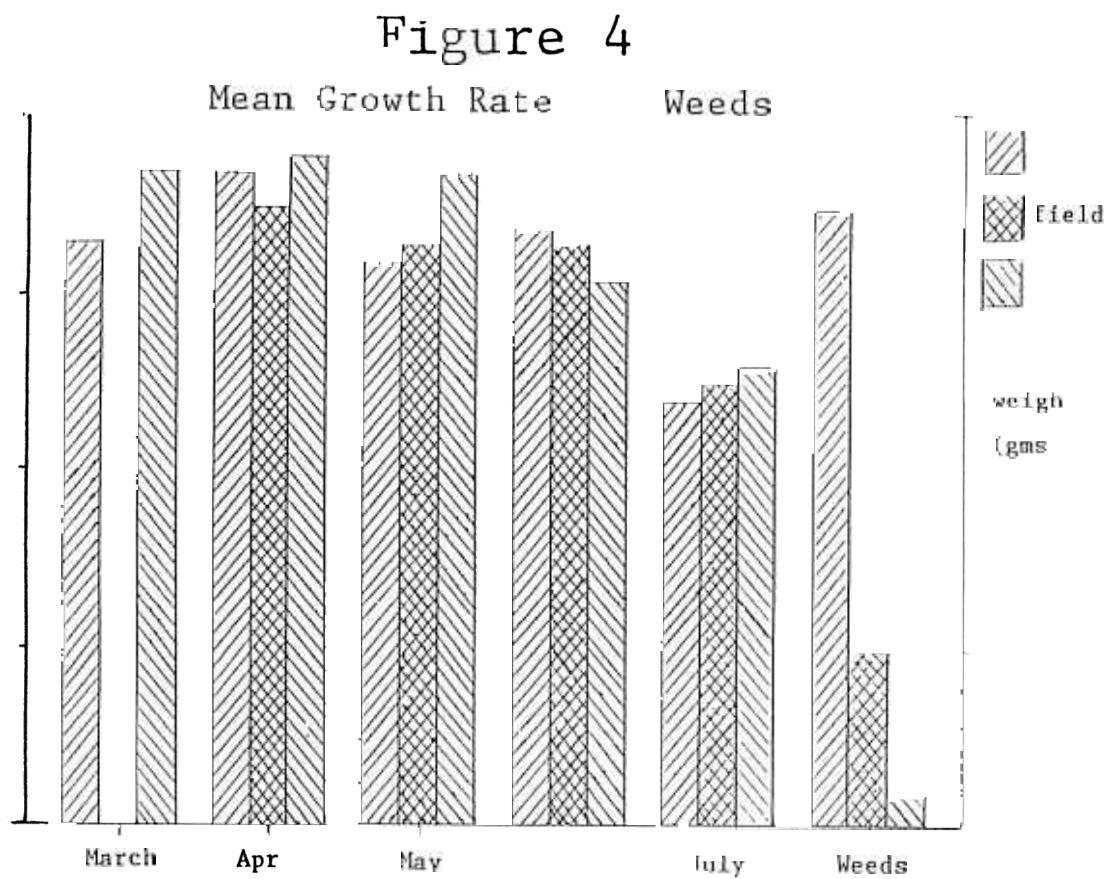
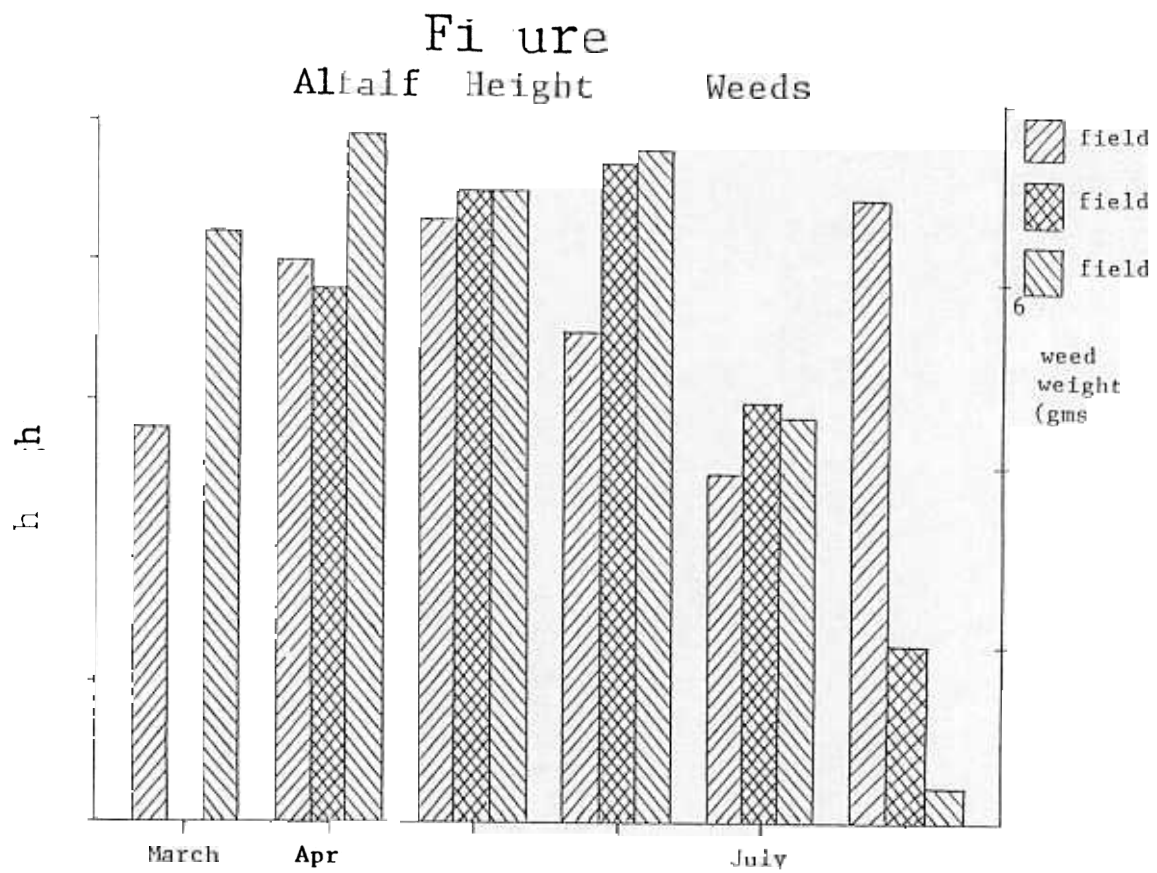
$$r = - .602$$

* weed weights were converted to logs before analysis

Figures 2-4 are graphs of three aspects of alfalfa growth (height, dry weight and mean growth rate [change in weight over time]), compared to weed biomass for each field. Field 3 was the most vigorous in March and April and had the fewest weeds. Evidently, the strength of a field early in the season is important in preventing weed problems. Biologically, since alfalfa is a perennial plant, the strength of the plant as it goes into the winter is going to determine its ability to resume growth next spring, even for non-dormant varieties such as CUF 101. Therefore, the alfalfa that is kept strong through the summer of 1986 will have fewer weeds in 1987. We are managing alfalfa for this year's production and next year's weeds.

Figure
Alfalfa Dry weight vs. Weeds





Another related aspect of alfalfa is that once the stand is lost, it does not recover. This means that herbicides, especially the grass herbicides such as Poast, will not rescue a weedy field. Table 1 is data from an alfalfa field that was very grassy. Poast was used at .5 lb ai/A (2.5 pts) on large prairie cupgrass in July, which resulted in complete kill. As shown, the dollar value of using Poast represents a \$40.50 smaller return compared to the untreated in this situation. This does not mean that Poast is not of value in alfalfa weed control, but that it has to be used in the proper situation. In my experience, removing weeds from a weak alfalfa stand will only result in another weed invading the field. In the case of weeds and alfalfa, an ounce of prevention is truly worth a pound of cure.

Table 1

ALFALFA PRODUCTION

	<u>Poast Treatment</u>	<u>Untreated</u>
Yield-Tons/A	.5	.9
Percent Alfalfa	100%	33%
Value/Ton	\$60.00	\$45.00
<u>Return/A</u>	<u>\$30.00</u>	<u>\$40.50</u>
Cost of Poast	\$30.00	\$ 0.00
Net Return	\$ 0.00	\$40.50

References

- Hagemann, R. W. and V. L. Marble. 1983. Variety response to cutting Schedules in Imperial Valley Proceeding, 13th California Alfalfa Symposium.
- Lehman, W. F. 1979, Alfalfa Production in the Low Desert Valley Areas of California. University of California, Division of Agricultural Sciences, Leaflet 21097.
- Norris, R. F. 1985. Effect of Cutting Frequency and Timing of Irrigation on Growth of Alfalfa (Medicago Satine) and yellow foxtail (Setaria glauca). Proceedings, Western Society of Weed Science. (38) 140-1.