

EFFECTIVE TANK MIXES

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Abstract: Tank mixing pesticides can be usefull to alfalfa producers to improve pest control efforts. Herbicides and insecticides can be combined to save time, costs and enhance results.

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INTRODUCTION

Tank mixing is the application of a mixture of pesticides. This practice may be usefull in many situations that occur in alfalfa pest control. The purpose of this presentation is to present some ideas and review some experiences in using tank mixes. To facilitate this discussion, trade names will be used. This is not to mean that these products are endorsed or that similar products are not acceptable.

WHY TANK MIX ?

The possible benefits of tank mixes may include greater efficacy, the possibility of getting the same results with less product, reduction in the number of trips across or over fields, better timing of application and cost reduction. Some of the potential problems that can occur include; label conflicts, increased toxicity, increased hazard of excessive residue prior to harvest, increased phytotoxicity, decreased selectivity, chemical antagonism and compatability problems. Many pesticides have restrictions as to the number of applications per season and/or cutting allowed on alfalfa hay. Tank mix applications must include this factor. Along with these concerns, are questions of liability and warranty. In this, as in all other aspects of pesticide use: READ THE LABEL!

If the label states "Do not mix this product with any other" then tank mixing with that product is forbidden. Labels change quite often and it is the responsibility of users to be aware of the current status of products they have or intend to use. Time of application can also be a conflict; two products that specify different timings for application cannot be applied together. Manufactuers may specify reccomended tank mixes on some labels. Use of any other mixes may void any warranty. Potential users are cautioned to contact manufactuers regarding suitability for use and extent of warranty.

The following discussion is a review of field experience using some tank mixes. This is intended only as a starting point for future discussion. This is not a recommendation or a suggestion for subsequent use. Potential users must consider their specific conditions and adjust accordingly. Pesticide results can be unpredictable at times because of the large number of factors that pertain to their use. Many of these factors are beyond human control. Proceede with caution and safety.

HERBICIDE TANK MIXES

For use on established alfalfa hay crops we have several herbicide products available. Karmex (diuron) continues to be a most usefull product for many weed control problems. It has long persistance agaist suseptible weeds, generally broad spectrum and low cost. The problems with Karmex include selection of resistant or non-suseptible weeds, marginal crop safety and crop rotation restrictions among others. Velpar is a relative newcomer for use on alfalfa hay. Its big advantage over Karmex is that it controls a much broader range of weeds, including many that Karmex misses. Velpar has long residual properties which requires restrictions on following crops but in the field it loses its residual effectiveness against weeds sooner

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than Karmex. Both Karmex and Velpar have restrictions about use on coarse (sandy) soils and dormancy at time of application. Considering the properties of these products, an obvious tank mix is Karmex + Velpar. This mixture offers the broadest spectrum weed control available. Velpar controls the resistant weeds and weeds which may have started growing at time of application. Karmex provides the residual to control some weeds in the later cuttings. In field use, low rates of these products have provided superior results than higher rates of the individual products. In a side by side comparison of 2 pints Velpar L + 1 lb. Karmex 80WP versus 3 pints Velpar L / acre the tank mix provided excellent control of winter weeds (foxtail barley, london rocket, common groundsel and shepardspurse) as did the Velpar L alone. However, by the time of third and fourth cutting, the treatment that included Karmex was still clean, while the Velpar L alone portion of the field was a mixture of pigweeds, lambsquarter and yellow foxtail, and a little alfalfa. Karmex alone is not enough to handle a bad yellow foxtail problem, but it helps. The rates to use of these can be found on the labels. We commonly use 2 pints Velpar L + 1 to 1½ lbs. of Karmex 80WP per acre. The Karmex rate needs to be adjusted to the soil types found in the field. More material is needed on clay soils and soils high in organic matter content. Higher rates of Velpar may be needed if more effectiveness is desired against perennial weeds. Some growers with basically clean fields use lower rates of both products to maintain very good weed control. This tank mix of Velpar + Karmex, applied early and properly, followed by granular trifluralin, applied early and properly has provided outstanding results against most weed problems found on many farms.

Another tank mix that is being used is also based on Karmex. Instead of using Velpar to control the Karmex escapes, Gramoxone Super is used. Gramoxone Super (paraquat) is a contact herbicide. It has virtually no soil residual activity. It is a "burndown" agent, causing rapid destruction of susceptible plant tissue. Fields treated with Gramoxone Super show massive dessication a few days following treatment. Gramoxone Super is effective on small weeds and weeds that are actively growing. There are several weeds which this material is weak against; cheeseweed, some mustards and most weeds that have attained growth past the seedling stage. When Karmex is added to Gramoxone much of this weakness is eliminated. This combination provides greater "burndown" than Gramoxone alone. The mix of Karmex + Velpar in comparison to Karmex + Gramoxone Super offers a few more weed species controlled and more effectiveness against perennial weeds but with added crop rotation restrictions because of Velpar. Commonly used rates are 2 pints Gramoxone Super + 1 to 2 lbs. Karmex 80W / acre, adjusting the rate of Karmex to fit the soil type in the field.

Other herbicide tank mixes which have been helpful include Kerb 50WP + Karmex 80WP. This mix is useful against a mixture of weeds that includes perennial cool-season grasses. Some use is also made of Velpar + Gramoxone Super. There are many other possible combinations which may fit in certain areas.

For use on seedling alfalfa, for post-emergent weed control, there are not presently any combinations that can work. Kerb, 24-DB and Poast all must be applied as individual treatments. A common question has been can Poast be combined with 24-DB? The answer is no. There appears to be an antagonism between these products. Kerb and 24-DB have completely different requirements following application to obtain good results and are not compatible. Future product registrations, if there are any, may change this aspect of weed control. We need better products for seedling weed control and a product to mix with Gramoxone Super to improve results against the weeds it is weak on.

As far as pre-plant herbicides, there is some use of EPTC-Balan mixes. Balan provides longer residual control, while EPTC has a broader spectrum of weeds that it is effective on. Sequential applications of herbicides seem to offer more hope than tank mixes for seedling weed control.

INSECTICIDE TANK MIXES

Tank mixing insecticides can provide longer lasting and more effective control of key pest species. It can also permit control of several pests with one application. Tank mixes of insecticides can be more potent than the individual components would indicate. Tank mixes may present more hazard of excessive residue at harvest than single materials. It is recommended that the pre-harvest interval be increased by 50% of the time required for the longer interval of the two chemicals in the mix. For example, if two products are mixed, one has a pre-harvest interval of 14 days and the other requires 10 days, the recommended time would be $14 + 7$ days = 21 days to harvest. Worker safety hazards are also increased when using tank mixes.

The Alfalfa weevil complex is the key pest problem in alfalfa production in most of California. Most fields require treatment when this pest is present to prevent serious damage to first cutting yields and subsequent weakening of the plants. This damage persists into the later cuttings. Good data exist on when to treat to prevent significant losses. Several materials are available to use for weevil control. Furadan is probably the most potent and persistent weevil pesticide. Furadan provides systemic, residual and contact control, the length of control being dependent on the dosage. This material will also control aphids, but it only seems to kill aphids directly contacted by the spray. Furadan is also very dangerous to waterfowl and beneficial insects. Aphids commonly build up to high populations following Furadan application, probably due to elimination of their natural enemies. Tank mixing an aphid material with Furadan seems to help avoid this problem. Suitable materials for this purpose would include Lorsban, Diazinon and Dimethoate. These materials also have some effectiveness against weevils and seem to enhance Furadan results. Lorsban + Furadan has looked particularly good in this regard. Typical rates are 1 pint each of Furadan 4F and Lorsban 4E. per acre. Some growers are using rates of $\frac{1}{2}$ pint per acre of each of these materials. This may work in hot weather and when the crop is closer to harvest. One important benefit of the use of Furadan mixes is that they seem to work in colder weather than other materials can tolerate.

Another chemical used to control weevils is Imidan. This material has moderately long residual activity against weevils but little effect on aphids. It is commonly tank mixed with a pesticide to control aphids such as Lorsban, Diazinon or Dimethoate. The mixes offer good control of both pests, less impact to beneficial insects and lower toxicity than mixes that contain Furadan. Typical rates are 1 to $1\frac{1}{2}$ lbs. Imidan 50WP + 1 pint of either Lorsban, Diazinon or Dimethoate 2.67 EC per acre.

Weevils and aphids are not the only pests of alfalfa. The summer months can bring the onset of the worm complex. This can include Alfalfa caterpillars, Beet armyworms, Yellow-striped armyworms, webworms and an assortment of cutworms. The armyworms seem to be the most difficult to deal with. Lannate and Lorsban have been the most often used products against these pests. Some people have felt that Lannate and Lorsban are losing their effectiveness to some degree. Armyworms are treated with pesticides on many other crops, so it would be reasonable to expect them to develop resistance to these pesticides. Javelin is a fairly new product which is available for use on alfalfa. This material is a biological pesticide which contains a strain of b.t. which has activity against armyworms, as well as Alfalfa caterpillar. Javelin is a logical tank mix for Lannate or Lorsban. Perhaps by using this mix it may be possible to delay resistance problems with Lannate or Lorsban. This mix will not be needed every year because the worm problem is not consistently bad. Javelin, as well as other b.t. materials, should be used when they can because of their low toxicity to non-target organisms.

The synthetic pyrethroids are becoming available to alfalfa growers. Another speaker will address the use of these materials. They may have a place in tank mixes because of their activity against many pests which are not presently well controlled or are resistant to other pesticides. Tank mixes seem to be harder on beneficial insects as well as the target pests. Hopefully, use of tank mixes may reduce need for later treatments that are more disruptive as the beneficials become more active.

HERBICIDE-INSECTICIDE TANK MIXES

Following the introduction of paraquat for alfalfa weed control, some growers felt that the paraquat was causing excessive stunting and injury to their alfalfa plants. The best results, in terms of weed control, with paraquat were accomplished by treating late in the winter period just as the alfalfa started to grow. At this time the alfalfa regrowth was still short, the weeds were still small enough to get good results and enough time was left to comply with the lengthy pre-harvest interval required for paraquat. Normally the alfalfa rapidly recovers from this treatment and resumes active growth. However, it was discovered that in some fields weevil emergence was already beginning and larval damage was occurring on the short first growth. Recommendations at that time called for a treatment when weevil feeding is retarding growth. The only way to know if retardation of growth is occurring is to treat and observe any differences in growth. When treatments were applied it was apparent that retardation was occurring. The combined effects of weevil damage and paraquat burn were devastating to first cutting yields.

To combat this problem, several people began to add insecticide to paraquat weed control mixes. Parathion was the first choice of many because of its low cost, expected efficacy and uncertainty about the effectiveness of weevil control at this time in crop development. Subsequent use showed that while the parathion was helpful, it wasn't strong enough or long lasting enough to do the job. Testing with other pesticides showed that Furadan was capable of providing good control for extended periods. The use of Furadan early in the season also revealed the full extent of the damage potential from early weevil feeding. Furadan performed well even in cold, wet weather that causes other pesticides to be less effective.

Last year some growers applied a tank mix of Furadan + Lorsban + Karmex + Gramoxone Super to control weeds, weevils and aphids with one application. The results were generally excellent. Some day we may even have a dinitroaniline material to add to this mix to control the summer weeds.

In summary, Tank mixing can be helpful in solving pest management problems in alfalfa production. By carefully reading and following labels, consulting with manufacturers and their representatives, understanding pest problems and how pesticides react under different conditions we can keep this useful practice available to our industry.

Gramoxone Super and Imidan are products of ICI Americas
Karmex, Velpar, Lannate are products of DuPont
Lorsban is a product of Dow
Furadan is a product of Mobay and FMC
Kerb is a product of Rhom&Haas
Poast is a product of BASF
Javelin is a product of Sandoz