



Herbicide-Fertilizer Combinations

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The "Weed and Feed" label has been given to the practice of applying combinations of herbicides and fertilizers during a single trip across the field. The practice has its widest use just before or soon after planting, when weed control and supplying crop nutrients are required at the same time.

When the practice of applying herbicide and fertilizer together is agronomically sound, it can mean a savings to the grower. A single application saves time as well as labor and reduces soil compaction by eliminating a field operation. Some herbicides require soil incorporation, which is compatible with fertilizer usage. With some postemergence treatments, crop injury is increased over that shown by the herbicide alone. The efficiency of use of phosphate and urea-base nitrogen fertilizer is likely to be low when applied postemergence or preemergence without incorporation.

Fertilizer Carriers: Some dry fertilizers are used for joint application with herbicides, but liquid fertilizers are by far the most common herbicide carriers. The major herbicide carriers have been liquid nitrogen solutions. Fertilizer suspensions are also used increasingly as herbicide carriers, although total tonnage is low to date. Suspension fertilizers are fluid products containing both dissolved and suspended plant nutrients.

Feasibility of Combinations: Herbicide-fertilizer combinations lend themselves to preplant, pre-emergence and postemergence applications. The first point of consideration with such combinations is whether there will be any reduction in effectiveness of either the herbicide or the fertilizer as a result of the combination. For most efficient use a starter fertilizer should be placed in a band to the side of and slightly below the seed. This is unacceptable placement for any herbicide. A preemergence herbicide should be applied to the soil surface in a band over the row or broadcast. This is inferior placement of a

starter fertilizer containing phosphate. It is important that the combination results in the proper placement and timing of both components. The economy gained from a single application is minor compared with the cost of poor performance.

Compatibility: Liquid fertilizers are often complex mixtures of essential plant nutrients. Most herbicides are complex organic molecules. Reactions from combining the two can result in anything from a uniform mixture to a thick gelatin or an oily scum. In certain instances, a reaction may occur which reduces the effectiveness of the fertilizer or the herbicide. Compatibility problems can be reduced by preparing the mixture just in advance of application.

The physical compatibility of a mixture should always be checked before mixing large quantities. A procedure for checking compatibility is:

1. Add 1 quart (.94 l) of liquid fertilizer to each of two jars.
2. Add the required herbicide (from Table 1) to each jar.
3. Add 1 teaspoon (5 ml) of a compatibility agent to one jar.
4. Shake the jars and allow to stand 1 hour and observe.
5. Allow to stand 1 day and observe.

If after standing the mixture does not separate either as a precipitate or an oily layer, a mixture has been formed which can be readily applied. If it does separate but shaking reforms the mixture, the combination can be used with vigorous agitation. The one day waiting period will point out problems that can arise if a combination is prepared and allowed to stand without agitation. Combinations which form precipitates or distinct droplets even with shaking should not be used. The compatibility agent in one jar indicates whether such an additive will be needed.

In general, wettable powders and flowable formulations are compatible with liquid fertilizers.

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Emulsifiable concentrates are intermediate in compatibility and water soluble liquids or powders show the most problems. The compatibility of some common herbicides with several liquid fertilizers is listed in Table 2.

Application Considerations: Agitation is usually required to maintain a uniform mixture of herbicide-fertilizer combinations. Mechanical paddle-type agitators are most effective. Mixtures that have been allowed to stand without agitation may be difficult to remix. The herbicide and fertilizer should be mixed just prior to use and agitation maintained until it is all applied.

Nozzle tips suitable for fertilizer application should be used for herbicide-fertilizer applications. Nozzle

tips designed for use with herbicides in water may not be satisfactory with fluid fertilizer as a carrier.

Uniform application is important in obtaining best performance of herbicide-fertilizer combinations. Some of the equipment commonly used for liquid fertilizer applications is not precise enough for use with herbicides.

Legal Aspects: Many, but not all, herbicides are labeled for use in combination with liquid fertilizer. A grower can legally tank-mix any separately labeled herbicide and fertilizer as long as the label does not prohibit this. However, the user assumes responsibility for performance and herbicide residues resulting from a non-labeled combination.

Table 1. Guidelines for checking compatibility of herbicide-fertilizer combinations.

Amount of liquid fertilizer to be applied		Amount of herbicide to be added to liquid fertilizer			
Gallons per acre	liters per hectare	per quart fertilizer		per liter fertilizer	
		Liquid ^a	Wettable powder ^b	Liquid ^a	Wettable powder ^b
10	94	5 tsp	8 tsp	25 ml	25 cc
20	187	2.5 tsp	4 tsp	13 ml	13 cc
40	374	1.3 tsp	2 tsp	7 ml	7 cc
80	758	0.6 tsp	1 tsp	3 ml	3 cc

^aBased on 4 lb/gal (0.45 kg/l) herbicide applied at 1 quart/A (2.3 l/ha)

^bBased on 80% WP herbicide applied at 3 lb/A (3.4 kg/ha)

Table 2. Compatibility of herbicide-fertilizer combinations mixed and then allowed to settle for 1 hour.^{a,b}

Herbicide	28-0-0	10-34-0 (40-65% polyphosphate)	11-37-0 (75-85% polyphosphate)	8-24-0	7-21-7 (40-65% polyphosphate)	8-24-8 (suspension) (40-65% polyphosphate)
Lasso	N	N	N	N	N	C
Atrazine	N	C	C	N	C	C
Sutan +	N	N	N	N	N	C
Amiben	C	N	C	C	C	C
Lorox	N	C	C	N	N	C
Ramrod	N	C	C	N	N	C
Teflan	N	N	C	N	N	C
2,4-D ester	N	N	N	N	N	C

^aRating system—C = compatible, N = distinct separation of fertilizer and herbicide so agitation will be required during application.

^bVirtually any combination which separates on standing can be resuspended with agitation. Wettable powders and crystals which separate on standing are the most difficult to disperse.

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