



**Control of Weedy Annual Grasses
in Perennial Grasses Grown for Seed**

A Progress Report

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Weedy grasses such as annual ryegrass and rattail fescue have plagued the grass seed grower for years. These plants in a seed crop not only reduce the yield of seed but they lower the quality of the seed. The seeds of annual ryegrass, rattail fescue, or silverhair grass are so nearly the same size and shape of the grass seed crops in which they are often found that it is nearly impossible to clean them out of a crop seed.

Since these weedy grasses are less desirable than the crop seed in which they are found, buyers are unwilling to pay the same price for them as they do for a crop such as Alta fescue. This means that with a high percentage of contamination of annual ryegrass in Alta fescue, the crop seed cannot be certified and consequently the grower has to accept a lower price for his seed if he is able to sell it at all.

With the rapid development of chemical weed control, several new chemicals have come into being which make it possible to selectively control the weedy annual grasses in grass seed crops. It goes without saying that the place to start cleaning up a seed crop is in the field and not in the cleaning plant.

Table 1 shows the advantage of treating in terms of yield of clean seed per acre and control of weedy grasses.

Table 1. Seed Yield and Contamination Control in Perennial Grass Seed Crops.

Seed crop treated	Seed yield ¹ after various treatments				Estimated control of weedy grasses ²	
	IPC, 3 pounds per acre	IPC, 4.5 pounds per acre	Chloro IPC, 3 pounds per acre	Chloro IPC, 4.5 pounds per acre	IPC, 3 pounds per acre	Chloro IPC, 3 pounds per acre
	<u>Per cent</u>	<u>Per cent</u>	<u>Per cent</u>	<u>Per cent</u>	<u>Per cent</u>	<u>Per cent</u>
Alta fescue	186	178	255	238	85	98
Chewings fescue.....	208	148	154	139	70	98
Red fescue.....	90	97	121	116	70	98

¹Yield data based on per cent of untreated check plot.

²Note that these percentages concern purity as well as yield of seed.

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Chemicals Used

Two chemicals developed recently have given especially good results in controlling weedy grasses in such crops as Alta fescue and creeping red fescue. They are IPC and Chloro IPC, also known as 3 Chloro IPC. Experiments to date have proved Chloro IPC the better of the two. A comparison of the two chemicals shows that IPC is the cheaper material to use and has a higher initial kill on the weedy grasses but requires more agitation and may be slightly more difficult to apply than the Chloro IPC. Chloro IPC, on the other hand, has a much longer residual effect in the soil--which gives better kill of the grass in the long run and is less apt to damage the Alta fescue or other crop at the dosage recommended. This chemical also usually gives a slightly better seed yield and is easier to apply.

Both of these chemicals are primarily effective on germinating seed and very young seedling grasses. Since these materials act through the soil, in order to be effective they must be in the soil and come in contact with the germinating seed or the root of the seedling plant. The success of treatment, with either IPC or Chloro IPC, depends upon how long the chemical will last in the soil. The longer the materials last the more effective the treatment.

A number of conditions influence the length of time IPC and Chloro IPC will be effective in the soil. The first and one most easily controlled is the rate of application or the number of pounds applied per acre. It is not profitable to increase the dosage of these chemicals above that recommended where you are attempting to control a weed in a crop. If too high a dosage is applied, the crop may be injured nearly as badly as the weed. In this case it is necessary to apply chemicals in such a manner and under such conditions that it will give the greatest possible effectiveness with the smallest effective dose per acre.

IPC and Chloro IPC are broken down in the soil by the microorganisms. This is favored by having a good supply of soil moisture and reasonably high temperatures. As the temperature decreases the microorganisms are less and less active and do not break down the chemical as rapidly. This means that fall, winter, or very early spring applications of IPC or Chloro IPC will be more effective than summer applications.

A little water helps by dissolving either of these chemicals and carrying them into the soil--but too much water is harmful in that it will, in time, leach or wash the chemical deep into the soil where it is no longer effective for weed control. Be sure, therefore, that these chemicals are put on early enough in the fall so they will act before being washed away by heavy winter rains.

Another factor that will influence the effectiveness of the treatment is the amount of straw and vegetation on the field. Since these chemicals must get into the soil before they become effective, anything that prevents them from getting into the soil reduces the effectiveness of the treatment. Straw or plant growth protects the surface of the soil and may catch enough of the chemical to prevent its getting into the soil to obtain the desired results. If there is much residue in the way of straw or leafy growth on the field, this should be removed by mowing and raking or burning before the treatment is made.

Soil type and drainage also affect the results obtained with Chloro IPC or IPC in spraying grass seed crops. These chemicals do not persist as long in light, sandy, well-drained soils as they do in heavier, poorly-drained soils. Generally the maximum dosage should be used on lighter soils and lighter dosages on heavier and poorly-drained soils. If there are pockets or low places in the field where water accumulates during the winter, it is advisable to drive a little more rapidly through these places so as to make a lighter application. The chemicals will wash from the slope toward these low places and accumulate there, resulting in some damage to the crop.

Method of Application

Either Chloro IPC or IPC may be applied with ground spray equipment or by airplane. The important feature of the application of these chemicals is not so much the volume of carrier with which they are applied as it is in getting a uniform distribution of the chemical over the surface of the soil. Care must be taken in spraying either with a ground sprayer or by air that the application is uniform and that there are not alternate of heavy and light applications. Either water or low volumes of oil may be used as a carrier for IPC or Chloro IPC. Where oil is used, the amount of oil used must be limited or injury to the grass will result.

The weather at the time of spraying these materials is not important, providing that the temperature does not exceed 70 degrees Fahrenheit during or following the spray application. IPC and Chloro IPC are just as effective when sprayed in the rain as during clear weather. Extremely low temperatures may cause difficulty in the application but the final results will be just as good if the application is uniform.

There are several formulations of IPC and Chloro IPC--each presenting a slightly different problem of application as follows:

Formulations of IPC

► Emulsifiable Concentrates--An emulsifiable concentrate is a liquid preparation in which the chemical has been dissolved in a suitable solvent and mixed with a so-called emulsifying agent. This preparation mixes readily with either water or oil. The emulsifiable IPC has, in the past, given difficulty because the IPC tended to settle out of the emulsion and plug spray nozzles. There has been considerable improvement in the formulations of this chemical, but to avoid difficulty one should use a spray rig with good agitation. Mix the water and chemicals by first putting the IPC in the tank and then adding the water slowly. Emulsifiable IPC has a greater tendency to settle out when cold. Where the temperatures of the water and of the atmosphere tend to be low, it would be advisable to add warm water to the mixture to keep the IPC in suspension.

► Wettable Powders--Wettable powders of IPC are fine-ground mixtures of IPC with some inert material (such as clay or talc) and a wetting agent. This material, when mixed with water, does not dissolve. The fine particles merely suspend in the water just as clay suspends in muddy water. Five gallons of water are required for each pound of wettable IPC in a spray application.

▶ Oil Concentrates--The so-called oil concentrate of IPC is a mixture of IPC in a solvent. This mixture is designed to be applied with oil (usually diesel oil) and will not mix with water. This mixture is for a low-volume application in oil, either by air or by ground machine. In no case, however, should more than $7\frac{1}{2}$ to 10 gallons of diesel oil be used per acre on Alta fescue and not more than 5 gallons per acre on the fine fescues. As little as 3 gallons of oil per acre will give nearly as good spray distribution without danger of injury to the crop.

▶ Dust Formulations of IPC--Dust preparations of IPC are on the market but they are best suited for small-acreage applications by ground equipment. The drift hazard with dust forms is much greater than with spray application. This method is not recommended in areas where any plant that may be injured by IPC is adjacent to the field to be treated.

▶ Pelleted Forms--Only recently has any work been done on the problem of pelleting IPC so that it could be applied with a fertilizer spreader. Experimental work with this formulation of IPC has indicated that it can be used successfully and gives results comparable to spray application. This form of IPC is not being marketed yet but may soon be available.

Formulations of Chloro IPC

▶ Emulsifiable concentrates--The emulsifiable concentrate of Chloro IPC is very similar to the emulsifiable concentrate of IPC. This material is much more stable than IPC when mixed with water, is less sensitive to temperature, and requires less agitation.

▶ Oil Concentrates--The oil concentrate of Chloro IPC is designed to mix with oil but not with water. Again, it was developed for low-volume application in oil, either with ground equipment or by airplane. (See precautions under "Oil Concentrates of IPC" concerning limited use of the diesel oil carrier.)

Time to Apply

For the control of weedy grasses in grass seed crops, Chloro IPC or IPC must be applied during the month of October under Western Oregon conditions. Applications made after the first of November may result in serious reductions in seed yield and, in some cases, injury to the crop plant. Experimental work to date shows no injury to seed crops treated with Chloro IPC or IPC at the recommended rates of application if the treatment is made at the recommended time. In the spraying of fine fescues it is desirable to make the treatment before the 20th of October and for Alta fescue the treatment should be made by the first of November. Table 2 shows the effect of different kinds of treatment on the yield of the crop seed.

Table 2. Seed Yield of Treated¹ Grass in Terms of Per Cent of October Yield.

Crop treated	Month treated		
	October Per cent	November Per cent	December Per cent
Alta fescue.....	100	0	83
Chewings fescue.....	100	0	5
Red fescue.....	100	1	59

¹All crops were treated with IPC at the rate of 4.5 pounds per acre.

Rate of Application

Neither Chloro IPC nor IPC should be applied at rates in excess of 4 pounds per acre on grass seed crops. From 3 to 4 pounds of material per acre are recommended for Alta fescue and not over 3 pounds for either Chewings or creeping red fescue. Where the soil is light and well drained a maximum of 4 pounds per acre may be used on Alta fescue, but as the soil becomes heavier and more poorly drained 3 pounds will be satisfactory.

These rates have been found safe and are effective on the weedy annual grass if applied either before the seed of the weedy grass germinates or while the seedlings are very small. After the weedy grass becomes well established, this rate of application may not be entirely effective. One of the reasons for preferring Chloro IPC, however, is that with its longer residual effect it has a higher or greater effectiveness against the larger seedling grasses.

Crops on Which Treatment is Recommended

The experimental work on the control of weedy annual grasses has been conducted on Alta fescue, creeping red fescue, and Chewings fescue. This treatment is recommended only for these three crops.

The age of the stand of the crop is important when considering application of the chemicals. The grass must be well established before treatment is made. Alta fescue may be treated when about 6 months old if well established. No more than 3 pounds of chemical per acre should be used. In the case of Chewings fescue or creeping red fescue, the stand must be at least 1 year old or older before treating.

Table 3. Tolerance of Certain Established Perennial Grass Seed Crops to IPC and Chloro IPC.

Seed crop	Quantity tolerated per acre		Chemical preferred
	IPC	Chloro IPC	
	Pounds	Pounds	
Alta fescue.....	4	4	Chloro IPC
Chewings fescue.....	3	3	IPC
Creeping red fescue	3	3	Chloro IPC

An experimental practice that some growers may wish to follow includes the use of the fertilizer calcium cyanamide with the IPC or Chloro IPC treatment. In this case, the practice is suggested only for Alta fescue. Within a week or ten days following the application of the IPC or Chloro IPC, from 3 to 4 hundred pounds of cyanamide is applied, which provides nitrogen for the grass growth and also assists in the kill of the weedy annual grass.

The use of Chloro IPC and IPC on grass seed crops has often been found to give a slight increase in seed yield. The treatment should not be made for this purpose but it may be of interest to the grower to know that this may in part help compensate for the treatment.

Table 4. Dosages Required to Kill Weedy Grasses

Weeds	Pre-emergence		Post-emergence		Chemical preferred
	Chloro IPC per acre	ICP per acre	Chloro ICP per acre	IPC per acre	
	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	<u>Pounds</u>	
<u>Annual grasses</u>					
Annual ryegrass.....	3-4	2-3	3-4	4-6	Chloro IPC
Annual bluegrass.....	2-3	4-5	3-4	6-8	Chloro IPC
Cheat-grass.....	2-3	2-3	3-5	4-6	Either
Chess.....	2-3	2-3	3-5	3-5	Either
Rattail fescue.....	3-4	3-4	3-4	3-4	Chloro IPC
Sweet vernal grass.....	3-4	2-3		3-4	IPC
Silver hair grass.....		3-4		4-6	IPC
Seedling velvet grass ...	2-3	4-5			Chloro IPC
<u>Perennial grasses</u>					
Velvet grass (Mesquite)..			5-8		Chloro IPC
Creeping velvet grass....			8-12	12-14	Chloro IPC
English ryegrass.....			5-8		Chloro IPC
Quackgrass.....			10-12	12-14	Either ¹
<u>Broad-leafed weeds</u>					
Chickweed.....	3-4				Chloro IPC
Sheep sorrel.....	3-4				Chloro IPC

¹Apply in 80 gallons of oil. Obviously the quantity of either IPC or Chloro IPC required to kill post-emergent perennial grasses would prohibit such control measures in other perennial grasses being grown for seed, except for spot treatment.

Crops on Which Treatment is not Recommended

Certain other seed crops have been treated on a field scale with IPC or Chloro IPC, but because there has not been sufficient work with these crops no recommendation is given for them. These include perennial or English ryegrass, bentgrass, meadow foxtail, orchard grass and Tualatin oatgrass. For those who are interested in experimenting with the control of weedy annual grasses in these crops, a table has been prepared on the suggested experimental treatment that might be used. In this case only a limited portion of the acreage should be treated.

Table 5. Suggestions for Trial (Not Officially Recommended).

Seed crop	Chemical preferred	Suggested rate per acre	Remarks
		<u>Pounds</u>	
Bent grass.....	IPC	4	Apply only in October.
Orchard grass.....	IPC or Chloro IPC	3-4	
Meadow foxtail.....	IPC or Chloro IPC	3-4	Treat only small portions of the acreage
English ryegrass.....	IPC	2 $\frac{1}{2}$ -3	
Tualatin oatgrass.....	IPC	4	