

COMBINE ADJUSTMENT FOR HARVESTING ALFALFA SEED

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NORMAL

Figure 1

DAMAGED



Idaho growers can save alfalfa seed and improve its quality by paying more attention to the proper adjustment of the combine. Harvesting conditions may vary greatly from year to year and even from day to day. Therefore, adjustment of the combine to fit specific conditions of the crop is essential.

Estimations are that about 20 per cent of the samples from the 1967 crop received at the Idaho Pure Seed Laboratory were low in germination and did not meet the 85 per cent germination as required for certification. The cause was mechanical injury (Figure 1). Harvesting conditions in 1967 were generally good and threshing was comparatively easy. Quite likely combine operators maintained cylinder speeds higher than necessary to thresh properly, resulting in excess mechanical injury.

In 1964 a similar germination problem occurred. Many lots showed poor germination due to mechanical injury. Harvesting conditions in 1964 were not good, because considerable rainy weather made the crop "tough" to thresh.

Seed is not marketable unless it meets certain minimum standards of germination. Seed that does not meet these standards must be re-run over special machines to remove cracked or broken seeds or "light seed" to improve germination. During this process, some good seed is unavoidably removed, adding to the loss of seed due to improper threshing.

Additional seed losses will be excessive if the combine is not properly equipped or adjusted dur-

ing harvest. To estimate seed losses, a rule of thumb is that five alfalfa seeds per square foot on the ground represent about one pound of seed loss per acre. A concentrated loss of 20 seeds per square foot in a 36 inch chaff windrow of a 12 foot combine also represents a seed loss of one pound per acre ($5 \text{ seeds/ft}^2 \times 12 \text{ ft} \div 3 \text{ ft} = 20 \text{ seeds/ft}^2$). It is difficult to maintain a seed-tight combine, eliminate all shatter losses, remove all seed during threshing, and keep seed from being carried over the walkers and cleaning shoe. However, these losses can be reduced if certain harvesting procedures and combine adjustments are used.

HARVESTING TIME

The harvesting rate is as important in alfalfa seed harvesting as it is in all other crops where the combine is used. Maintaining a constant feed rate of 145 pounds per minute of material entering the machine is another rule of thumb to determine the correct feed rate. To maintain this rate, it is necessary to vary the forward speed of the machine. Alfalfa seed losses increase rapidly if the 145 pounds per minute feed rate is exceeded or reduced. (A 10 per cent increase in feed rate above 145 pounds per minutes will increase the total seed loss by 20 per cent.)

In Table I, the ground speed is given for two widths of cut to obtain the 145 pounds per minute feed rate as determined by the stand of alfalfa in the field on a dry weight basis.

Table I. To obtain an average 145#/min. of material entering the machine, calculate or estimate the tons per acre (dry weight) of alfalfa in the field, select the appropriate width of cut of the machine, and then determine the correct speed of the machine.

Width of Cut Feet	Tons per acre	Miles per hour
12	1.5	1.99
	2.0	1.49
	2.5	1.20
	3.0	1.00
	3.5	0.85
14	1.5	1.71
	2.0	1.28
	2.5	1.02
	3.0	0.85
	3.5	0.73

*This information was calculated by using the formula:

$$Y = \frac{35.89}{X \times Z}$$

where:

Y = miles per hour
X = tons per acre
Z = width of cut

METHOD OF HARVEST

If you are harvesting spray cured stands by the direct-cut method, a short vertical cutter bar on one end of the platform or header will help to reduce shatter losses. Lifter guards should be used. In light stands, the reel may be removed.

For the windrowed method, use a belt pick-up device for best results. The belt pick-up should be ground driven at a speed 10 to 15 per cent faster than the ground speed of the machine. A block mounted on the cutter bar edge of the platform will help prevent pods and free seed from being carried off the front edge of the header.

When using either the direct-cut or the pick-up belt method, the speed of the platform feed auger should be reduced to get good feeding action. Spray-cured stands may require reducing the auger speed 50 per cent below the speed recommended by the manufacturer.



Figure 2

CYLINDER ADJUSTMENT

The cylinder is properly adjusted when the closest cylinder bar is not less than $\frac{1}{8}$ inch and not more than $\frac{3}{8}$ inch from the concave on the rasp-bar cylinder. Even though the front clearance is usually greater than the rear clearance on most machines, this $\frac{1}{8}$ - $\frac{3}{8}$ inch tolerance should be maintained. In very heavy crops a $\frac{5}{8}$ inch clearance may be needed if the feed rate cannot be decreased sufficiently.

CYLINDER SPEED

Studies have shown that the amount of seed damage is closely related to the surface speed of the cylinder. The studies conclude that when combines were properly adjusted, visible damage could be reduced to 5 per cent or less. Damaged

seed can be determined by means of a hand lens (Figure 2).

Excessive cylinder speed will also cause the cylinder to break up the straw to a greater extent and overload the separating shoe. Too low a cylinder speed will increase the amount of unthreshed seed. Lower cylinder speeds can be used when flax rolls are mounted in front of the cylinder.

To calculate proper cylinder surface speed, first multiply the cylinder diameter (feet) by 3.14 to obtain the cylinder circumference. Then, multiply the circumference by cylinder speed (rpm). Use the lowest cylinder speed whenever possible. Recommended cylinder speeds are shown in Table 2 for windrowed and spray-cured cut alfalfa.

Table 2. Surface speed under varying conditions.

WINDROWED:

Without Flax Rolls	3600-4400 ft. per min.
With Flax Rolls	4200-4800 ft. per min.

SPRAY-CURED:

4000-5000 ft. per min.

STRAW WALKERS

The straw walkers should be operated at the manufacturer's recommended speed and checked regularly to be sure they are not plugged. The walker curtain or curtains should be examined to be sure they are not torn and are in the down position.

CLEANING SHOE AND FAN

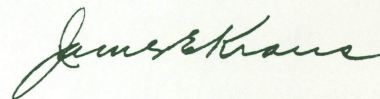
Under most conditions, the adjustable chaffers, which are used on most combines, should be set with openings of $\frac{1}{2}$ to $\frac{9}{16}$ inch, measured at right angles to the axis of the openings. A $\frac{1}{10}$ inch hole is the smallest hole that should be used on a round hole, clean grain sieve. Sieve hole sizes up to $\frac{5}{32}$ inch diameter give good results. All sieves should be cleaned at least twice each day. To obtain the proper wind adjustment, the fan shutters should be opened to the maximum and closed gradually to decrease the amount of wind going over the shoe until a minimum seed loss is obtained. Or on machines equipped with variable speed fans, the fan speed can be gradually decreased to obtain the same effect. After each change, the previous seed loss over the shoe should be checked. When the wind is properly adjusted there should be only an occasional light seed in the air stream and a minimum loss of free seed riding over with the chaff.

In case the amount of wind is still too high after the shutters are closed or fan speed decreased, it may be necessary to remove some of the fan blades. **Be sure to keep the fan in balance.** If removal of the fan blades is not possible, the shutters should be modified so the wind can be controlled more. The wind should be adjusted for maximum seed recovery rather than for clean seed. The wind deflector should be set to direct the air blast at the front to the center part of the chaffer. The chaffer extension should be raised

about one inch at the rear and opened a little wider than the main chaffer to obtain maximum recovery of unthreshed pods and free seeds missed by the chaffer.

Care should be taken to prevent unnecessary amounts of tailings passing through the return auger. If this happens, the return auger or elevator will plug. This results in additional seed loss in cleaning out the machine and a loss of operating time.

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