

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

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SOIL CONSERVATION SERVICE

Plant Materials Technical Note No. 7

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GRASS-LEGUME-FORB SEED DILUTION WITH RICE HULLS

When a mixture of different-sized seeds is planted, it may be advisable to include a diluting agent such as rice hulls. When mixed together, grass, legume and forb seeds feed through a drill at variable rates. Rice hulls, a superior seed diluent, should be used to facilitate the drilling for hay, pasture, range or critical areas.

Rice hulls when used as a diluent will:

1. Give uniform distribution of different-sized seeds at accurate seeding rates.
2. Keep grass-legume-forb mixtures in constant proportion by reducing or preventing separation during drilling.
3. Feed through a grain drill at the same volume rates as barley, bushel for bushel.
4. Prevent "bridging" of light, fluffy seed.

Guidelines: Follow these guidelines when preparing to use rice hulls as a seed diluent:

1. Rice hulls are cupped and tend to hold seeds suspended in a mixture, but small-seeded legumes and some grass seed may settle to the bottom of the drill box as the drill moves and bounces. To prevent this, fill the drill box no more than half-full at any one time. The mixture in the drill box should be stirred occasionally.
2. When the amount of seed to rice hulls exceeds one-half of a bushel, or for fluffy seeds such as Garrison creeping foxtail, follow the procedure outlined in Step 4 a or b. Then add another bushel of rice hulls and set the drill to seed two bushels of barley per acre. This situation will often occur for special seedings such as waterways, roadsides, critical areas or increased seeding rates because of low pure live seed.

3. Any change in drill row spacing will change the drill setting. Example: The drill is calibrated for one bushel of barley and an alternate row seeding is planned. Only one-half of the feed holes will be operating. In this situation, increase the volume of material being seeded from one to two bushels per acre.

Steps: The following steps are recommended when using rice hulls:

1. Become familiar with the drill being used. Check the drill seeding chart. Consult with the farmer on drill settings for barley.
2. Run the drill over a hard surface and count the barley seeds in five feet of row length. Do this for four rows (2 each side), average the number of seeds per foot and compare with Table 1. If there is a separate box for legumes, calibrate in the same way, except use the legume being seeded instead of barley.
3. Make sure a set of platform scales is available plus a good, clean, hard surface to mix the rice hulls and seed. Use good, cleaned rice hulls - not crushed or shredded.
4. Procedure to determine mixture amounts:

a. Seed bushel weight method;

Example 1. Plan is to seed 7 pounds Manchar smooth brome per acre from Table 2, Manchar weighs 21.3 pounds per bushel. At 7 pounds per acre, this would be 33 percent of a bushel ($21.3 \div 7 = 3.04$). Sixty-seven percent of the mixture would be rice hulls. From Table 2, rice hulls weigh 9 pounds per bushel. Therefore, 6 pounds will be rice hulls to complete one bushel of the mixture ($9 \text{ pounds} \times 67 \text{ percent} = 6.03 \text{ pounds}$).

The total mix is 7 pounds Manchar plus 6 pounds rice hulls. The drill is set at one bushel of barley.

Example 2. Plan is to seed 8 pounds Luna pubescent wheatgrass, 4 pounds Magnar basin wildrye, and 2 pounds Delar small burnet per acre.

Luna weighs 23.4/bu. @ 8 pounds/ac. =	34%
Magnar weighs 17.3/bu. @ 4 pounds/ac. =	23%
Delar weighs 21.6/bu. @ 2 pounds /ac. =	<u>9%</u>
Total percent of bushel	66%

Rice hulls will be 34% of mixture
 $(.34 \times 9 \text{ pounds/ac.} = 3 \text{ pounds})$

Note: Since the seed mixture represents more than one-half the volume mix of the seed and rice hulls as calculated above, add one additional bushel of rice hulls and set the drill at two bushels of barley. (See Guideline 2).

- b. Seed volume method: (Have a one-bushel measure available).
In this method, weigh the seed needed to seed one acre. Place the seed in a one-bushel measure and finish filling with rice hulls.

Using Example 1. You will estimate the seed is less than one-half of the volume. Set the drill at one bushel of barley.

Using Example 2. You will estimate the seed is less than one-half of the volume, so one additional bushel of rice hulls is needed. Set the drill at two bushels of barley.

In all cases, mix the seed and rice hulls thoroughly before putting them in the drill. Set the drill and start seeding.

TABLE 1

Grain Drill Calibration Using Barley

Grain Drill Spacing	Total Feed/Ac:	Barley Seeds/Foot: @ 1 Bushel */Acre:	Barley Seeds/Foot @ 2 Bushels */Acre
6 inches	87,120	7.5	15.0
7 inches	74,674	8.7	17.5
8 inches	65,340	10.0	20.0
9 inches	58,080	11.2	22.5
12 inches	43,560	15.0	30.0
14 inches	37,337	17.5	34.0

* Barley at 48 pounds per bushel has approximately 143,600 seeds per pound.

Work done at the Pullman PMC has demonstrated that all grass seed that had awns before combining and processing should not be more than 30-35 percent by volume of any mixture with rice hulls. Tips of awns still on the seeds, plus their light weight, will cause some "bridging" in the drill unless rice hulls constitute 65-70% of the mixture by volume.

Rice hull mixtures work better in the older flute-feed drills (no plastic) as compared to many of the new model drills. An agitator is a very useful attachment as an aid in maintaining a constant flow of seed.

TABLE 2

Material	Lbs per Bushel	Material	Lbs per Bushel
Fairway crested wheatgrass	24.5	Magnar basin wildrye	17.3
Nordan crested wheatgrass	25.8	Fawn tall fescue	24.5
Jose and Alkar tall wheatgrass	18.3	Appar Lewis flax	47.5
Tegmar intermediate wheatgrass	24.4	Remont sainfoin	28.6
Whitmar beardless wheatgrass	21.4	Nezpar Indian ricegrass	42.8
Sodar streambank wheatgrass	16.9	Ioreed canarygrass	34.1
P-27 Siberian wheatgrass	24.2	Sherman big bluegrass	19.5
Luna & Topar pubescent wheatgrass	23.4	Proso millet	52.6
Garrison creeping foxtail	10.6	Foxtail millet	47.9
Lutana milkvetch	63.2	Delar small burnet	21.6
Regar meadow bromegrass	21.7	Marshfield big trefoil	63.6
Manchar smooth bromegrass	21.3	Kalo birdsfoot trefoil	63.4
Latar orchardgrass	18.8	Rice hulls (cleaned)	9.0
		T2950 bluebunch	20.4
		Covar sheep fescue	25.8
		Canbar Canby bluegrass	18.5
		Ephraim crested whtgrass	25.8
		Secar bluebunch whtgrass	20.0