TECHNICAL NOTES
U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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SPRAY-ON ADHESIVES FOR ANCHORING STRAW MULCH

The Agronomy Progress Report enclosed with this technical note was prepared by Burgess L. Kay, wildlands seeding specialist, University of California, Davis. The experimental data presented supplements mulching information given in Agronomy Technical Notes No. 22, 24, 25, 28, and 29.

Kay's studies suggest that three materials tested when properly applied at sufficient rates will hold straw mulch in place against wind velocities up to 80 miles per hour. It should be noted that only one ton of straw per acre was used in the studies. The two ton per acre rate ordinarily specified by SCS for protecting disturbed sites would probably require more spray-on material than Kay's report indicates for anchoring one ton of straw.

I would suggest that for field use where these materials are used with two ton per acre straw application rates, the amount of spray material used should be increased a minimum of 50 per cent. Thus we would specify no less than:

600 gallons of SS-1 Asphalt per acre; or,
135 pounds of Terra Tack I plus 375 pounds wood fiber per acre; or,
135 pounds of Terra Tack II plus 450 pounds wood fiber per acre.

Apparently, both Terra Tack I and II will require mixing with at least 2000 gallons of water per acre for the application rates listed above to obtain even distribution and best results.

Marvin F. Hollingshead
Marvin F. Hollingshead
State Conservation Agronomist

Enclosure

UNIVERSITY OF CALIFORNIA, DAVIS

AGRONOMY PROGRESS REPORT

Agricultural Experiment Station — Agricultural Extension Service

No. 63 — February 15, 1975

TACKIFIERS FOR STRAW MULCH[1/]

Burgess L. Kay[2/]

Straw is an excellent mulch for stabilizing soil, encouraging seed germination, and speeding plant growth. However, straw must be incorporated into the soil (disked or rolled), or held down with a net or sprayed chemical tackifier. A commonly used chemical tackifier is asphalt emulsion. The following tests investigate the merits of products which may be substituted for asphalt. The results agree with three earlier tests (unreported), and are presented as a summary of all testing with tackifiers.

PROCEDURE

Barley straw was broadcast at 2,000 lb/acre on the surface of greenhouse flats filled with decomposed granite. The chemicals listed in table 1 were sprayed over the straw. Further details on individual products are in the discussion section. After curing, the flats were inclined on a 2:1 slope and subjected to winds of up to 84 mph created by a Finn Bantam straw blower. Velocities to 35 mph were measured with an anemometer, and higher velocities were measured with a pitot tube. Table 1 shows the velocity at which 50% of the straw blew away.

RESULTS AND DISCUSSION

Asphalt emulsion. This product is commonly used in the eastern U.S. at rates of 200 to 500 gpa. The Asphalt Institute recommends 484 gpa. Asphalt is seldom used in California because of the hazard of accidentally getting this black sticky substance on nearby surfaces. In this and other tests it was observed to soften, allowing the straw to slip from the flats in hot weather. It may have to be heated, as in this test, to permit spraying. The black color probably helps increase soil temperatures and may encourage growth in cool weather. AE was applied under the product specifications SS-1, and was an excellent tackifier at 400 and 600 gpa. Six hundred gallons was superior to 400 gal. Two hundred gallons was not satisfactory.

Terra Tack I is a free-flowing powder produced from the ground endosperm of a natural vegetable gum, guar *(Cyamopsis tetragonoloba)*, and contains gelling and hardening agents. It is applied at 40 lb/acre in 600 gpa or more of water (1600 gpa in this study), and 250 lb/acre of wood fiber. When mixed with water and properly cured it forms an insoluble network. It is colorless,

1/ No endorsements are implied herein.

2/ Wildlands Seeding Specialist, Department of Agronomy and Range Science, University of California, Davis, California 95616.

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Table 1. Effect of tackifier products on wind stability of barley straw broadcast at 2,000 lb/acre.

Product	Rate/acre chemical	Fiber lb/ac	Wind speed at which 50% of straw was blown away				
			Trial 1	Trial 2	Trial 3	Trial 4	Mean
None	--	--	8-10	8-10	8-10	8-10	9
SS-1 Asphalt	200 gal	--	45	35	40	40	40
SS-1 Asphalt	400 gal	--	84+	75	84+	79	80
SS-1 Asphalt	600 gal	--	84+	84+	84+	84+	84+
Terra Tack I	40 lb	250	67	75	63	72	69
	89 lb	250	84	81	84+	80	82
Terra Tack II	45 lb	150	63	81	58	69	68
	90 lb	300	84+	84+	84+	84+	84+
Aerospray 70	50 gal	--	20	15	20	13	17
	100 gal	--	30	20	15	25	22
	50 gal	250	48	45	35	50	44
	100 gal	250	84+	45	35	50	54
Curasol AH	45 gal	250	30	40	40	40	38
	90 gal	250	66	63	64	63	64
	180 gal	250	84+	84+	75	63	76
Soil Seal	100 gal	250	84+	72	63	84	76

unaffected by heat, and can be removed easily from spills or oversprays. The higher rate tested gave results similar to asphalt at 400 gpa.

Terra Tack II is a free-flowing powder produced from semirefined seaweed extracts. It is sold as two parts, the alginase and a gelling agent. These are mixed with water (750 gpa) and fiber (150 lb/acre). When properly mixed, it polymerizes, and upon application forms an insoluble network of binding membranes. Proper mixing is essential. This product is also nonstaining and easy to clean up. When using the low rate tested here it must be applied in stringers or lines rather than uniformly since it is too viscous to give complete coverage at this rate. The resulting network will give satisfactory results under less severe conditions. A higher rate should be used for steeper slopes, heavy traffic, or areas of high wind. The higher rate used here (1,500 gpa water) gave results comparable to 600 gpa asphalt. Terra Tack II at the high rate was superior to all of the nonasphalt treatments.

Aerospray 70 and Curasol AH are white liquid glues (polyvinylacetates). They may be corrosive to equipment if not carefully flushed off. They have considerable binding effect on soil and are excellent for erosion control if used at high enough amounts and the proper dilution rates. As straw tackifiers they must be used with wood fiber, as can be noted with Aerospray in table 1. The low rate of 50 gpa with fiber was superior to 100 gpa without fiber. None of the rates tested gave results equal to 400 gpa of asphalt. Under excessively high rainfall, however, these products might prove superior if used at higher rates than tested here. Aerospray was applied as 10 parts water to 1 part product, and Curasol as 11 parts water to 1 of product.

Soil Seal, a liquid plastic (co-polymer of methacrylates and acrylates) is not normally advertised as a straw tackifier. However, it was tested here as 10 parts water and 1 part concentrate and proved to be equal to a much higher volume of Curasol.

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