

DRYING ACCELERATORS FOR ALFALFA HAY

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Field curing of alfalfa hay is one of the most critical operations in producing a profitable and good quality crop. The hay must dry down to less than 26 percent moisture before it can be baled and safely stored. In the Pecos Valley the time required for the harvested crop to reach a safe moisture level requires from two to six days. Most of the harvest losses occur during this period due to rainfall, respiration, and mechanical loss.

The objectives of this project are to evaluate the effectiveness of commercially available chemical drying agents, harvest methods, and techniques for reducing curing time of alfalfa hay.

The most popular harvest method for alfalfa in the Pecos Valley is cutting the crop with a swather/windrower. The machines most commonly used harvest a swath 12-16 feet wide, crimp the plant material, and deposit it in a windrow 44-56 inches wide. Chemical drying agents are applied to the alfalfa just in front of the swather reel during harvest. The purpose of the chemical is to speed the drying of the stems but not the leaves.

Drying agents tested in one or more studies during the 1982 and 1983 growing seasons are:

| <u>Manufacturer's Name</u> | <u>Brand Name</u> | <u>Comments or Description</u> |
|----------------------------|-----------------------|---|
| Allen, Inc. | PROCURE ^{1/} | Soluble, dry granular mixture |
| Domain, Inc. | CUT-N-DRY | 2 part mixture of dry granular and a liquid |
| " | EXPERIMENTAL | Unknown |
| " | EXPERIMENTAL | Unknown |
| Fenn & Co., Inc. | CONSERVIT | Soluble, dry granular mixture |
| McNeill's of Iowa | QUIK-M-CURE | Semi-liquid soluble concentrate |

In addition to work with drying agents we compared the New Holland 1499 mower/conditioner to a conventional swather/windrower in a study done in August 1982.

Other studies have been conducted using the Micron, Inc. MICROMAX CDS applicator and applying lower volumes of drying agents with and without a push bar to bend the alfalfa over during application. Another study, conducted in August 1982, tested application at lower volumes using cone spray tips.

Windrow data were obtained by cutting a "slice" out of each windrow. The entire sample was weighed and oven dried. Samples were obtained at approximately four hour intervals.

RESULTS AND DISCUSSION

In October 1982 CUT-N-DRY, CONSERVIT, and QUIK-M-CURE were compared in a trial using a public formula containing 2 percent fatty acid, 2.76 percent potassium carbonate, and 0.2 percent Ortho X-77 with untreated check plots. Windrow moisture data are shown in Table 1

Table 1: Windrow moisture concentration of hay treated with drying agents and untreated checks. N.M.S.U. Agricultural Science Center at Artesia, N.M.. October 1982.

| <u>Treatments</u> | <u>Time</u> | | | | | | | | |
|-------------------|-------------|------------|------------|------------|------------|-------------|------------|-------------------|-------------|
| | <u>6pm</u> | <u>12M</u> | <u>6am</u> | <u>12N</u> | <u>6pm</u> | <u>11pm</u> | <u>7am</u> | <u>12N</u> | <u>11am</u> |
| CUT-N-DRY | 35a* | 47a | 51a | 32a | 30b | 24a | 38ab | 14a ^{1/} | - |
| CONSERVIT | 44bc | 54b | 59b | 35a | 29ab | 28a | 44c | 14a | - |
| QUIK-M-CURE | 39ab | 47a | 58b | 39b | 25a | 26a | 37a | 24b | - |

1/ Trade names are used in this publication to simplify the information presented. Use of trade names does not imply an endorsement of the product nor criticism of similar products that are not mentioned.

| Treatment | 6pm | 12M | 6am | 12N | 6pm | 11pm | 7am | 12N | 11am |
|-----------|------|-----|-----|-----|-----|------|------|-----|--------------------------------|
| PUBLIC | 44bc | 46a | 48a | 32a | 22a | 26a | 42bc | 16a | |
| UNTREATED | 49c | 58b | 67c | 58c | 44c | 37b | 45c | - | 29 ² / ₂ |

* Means within a column not followed by the same letter are significantly different
P = 0.05.

1/ Treated hay was baled.

2/ Untreated hay was not baled until 11:00am, Oct. 6.

There were very little differences found between the drying agents tested in this trial. Thirty-six hours after application all the treated plots were below 30 percent moisture while the untreated plots were 37 percent. It was observed during this study, and substantiated by the data, that windrows in the QUIK-M-CURE plots collapsed 36-48 hours after treatment. This would explain the higher moisture concentrations in the QUIK-M-CURE plots when baled October 5th. Collapse of the windrows would increase the density of the hay in the windrow and slow the drying rate.

In August 1982 a study was conducted to compare drying rates of alfalfa harvested with a New Holland 1499 mower/conditioner (sometimes called a "Haybine") to those harvested with a conventional Case 560 swather/windrower. The New Holland 1499 harvested a 12 foot swath and deposited the crimped hay in a 9.5 foot wide windrow. The Case 560 also harvested a 12 foot swath, but deposited the crimped hay in a 3.5 foot wide windrow.

Windrow moisture data are shown in Table 2.

Table 2: Percent windrow moisture of hay harvested with the New Holland 1499 Mower/Conditioner as compared to a conventional swather/windrower. N.M.S.U. Agricultural Science Center at Artesia, N.M.. August 1982.

| Date | Time | Harvesting Method * | |
|------------------------------|---------|---------------------|----------|
| | | New Holland 1499 | Case 560 |
| ----- Percent Moisture ----- | | | |
| August 11 | 4:00pm | 71 | 76 |
| | 12 Mid. | 53 | 67 |
| August 12 | 4:00am | 48 | 62 |
| | 8:00am | 37 | 58 |
| | 12 Noon | 28 | 52 |
| | 6:00pm | 16 | 44 |
| | 12 Mid. | 20 | 43 |
| August 13 | 6:00am | 27 | 48 |
| | 9:00am | 26 | 49 |
| | 12 Noon | Baled | 50 |
| | 4:00pm | 13 | 39 |
| | 8:00pm | Baled | 33 |
| August 14 | 12 Mid. | - | 38 |
| | 4:00am | - | 40 |
| | 8:00am | - | 40 |
| | 12 Noon | - | 30 |
| | 2:00pm | - | 24 |
| August 15 | 4:00pm | - | 18 |
| | 8:00pm | - | 12 |
| | 12 Mid. | - | 18 |
| | 4:00am | - | 25 |

* Hay cut between 9:00 am and 11:00 am, August 11, 1982.

The New Holland 1499 harvested plots were raked into windrows 46 hours after harvest. The Case 560 harvested plots were raked to move the windrows 12 feet at the same time.

- spacing on boom mounted 14 inches above push bar.
5. EXPERIMENTAL, @30gpa, fans 7.5 lbs. dry experimental compound in 30 gallons of water per acre. Applied using 8002 fan tips mounted as in Treatment (4).
 6. CUT-N-DRY, @30gpa, fans 7.5 lbs. dry material + 3 qts. liquid portion in 30 gallons of water per acre. Applied as in Treatment (5).
 7. CUT-N-DRY, @30gpa, cones 7.5 lbs. dry material + 3 qts. liquid portion in 30 gallons of water per acre. Applied as in Treatment (4).
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Table 4. Windrow moisture data comparing two drying agents at different rates and volumes. N.M.S.U. Agricultural Science Center at Artesia, N.M.. September 1983.

| Treatment Number | Date and Time | | | |
|------------------|------------------------------|----------|------|------|
| | Sept. 16 | Sept. 17 | | |
| | 8 pm | 8 am | 12 N | 5 pm |
| | ----- Percent Moisture ----- | | | |
| 1. | 30 | 62 | 17 | 14 |
| | 39 | 59 | 29 | 21 |
| 2. | 38 | 62 | 24 | 19 |
| check | 45 | 60 | 30 | 24 |
| 3. | 35 | 62 | 16 | 12 |
| check | 43 | 60 | 31 | 21 |
| 4. | 40 | 62 | 14 | 13 |
| check | 43 | 67 | 30 | |
| 5. | 35 | 63 | 16 | |
| | 40 | 62 | 26 | 21 |
| 6. | 38 | 59 | 20 | 13 |
| check | 44 | 65 | 26 | 22 |
| | 33 | 60 | 22 | 13 |
| check | 43 | 67 | 29 | 21 |

All the treatments were significantly dryer than the untreated checks 36 hours after harvest. Windrows treated with Treatment 2 (0.5 rate CUT-N-DRY @5gpa) dried at a slower rate than those receiving the other treatments.