

hay or straw with another piece of machinery, and then tacking the mulch to the ground with sometimes a third piece of machinery.

Hydro-mulching, sometimes referred to as low-profile mulch, is a recent technological development in which the seed, fertilizer, and mulch are applied in a one-step process. Hydro-mulching has experienced significant success in the more humid eastern United States. The differences in the effects of the two mulches are simply that the higher-profile straw mulch is a more effective insulator and it helps retain moisture better. R.E. Blaser found that straw mulch tacked with wood fiber could possibly be the best treatment for a late fall planting, thus expecting the emergence of seedlings the following spring. If this procedure is adopted, it may well be that a new piece of equipment will evolve that combines the use of straw-mulching with hydro-mulching.

Other research has been done on the use of poly foams to simulate the high-profile effect of straw with possible use of the hydro-mulch machine. A significant advance is predicted in the near future to develop a machine that will pump a thicker slurry of wood fiber in the conventional hydro-mulching process. If the ratio of water to wood fiber can be reduced in the process, then the economics of hydro-mulching will be improved for a significant labor savings.

One piece of machinery likely to develop in the future is a machine combining high-profile and low-profile mulch. A second piece of machinery possible in the future will be some type of foam mulch dispenser. The futuristic machine we will all see in the next few years is a hydro-mulch capable of pumping more fiber per gallon of water.

#### WICK APPLICATORS Wayne W. Huffine

Several wick applicators are commercially available; however, Oklahoma uses BoBar rope applicator for roadside weed control investigations. It is designed for use on rights-of-way, including irregular terrains. We have worked with two BoBar wick applicators—one, an experimental unit about 6.5 ft wide mounted on the front of a pick-up truck, and the other, a three-unit BoBar Compensating Feed Rope Applicator that uses the tractor's existing hydraulic system and control valve. With both wings fully extended, it will effectively treat an area 14 ft wide.

One of the unique features of this kind of applicator is the ability to control high-growing weed species, such as Johnsongrass, while permitting low-growing erosion-resistant vegetation, such as Bermuda grass, to remain. Johnsongrass can effectively be controlled by using an appropriate herbicide with this machinery. For best results, the herbicide should be applied to actively growing plants when most have reached the boot to head stage of growth. The wick applicators are designed to apply herbicide to the stem and underside of leaves and undesirable plants. The advantages of the applicator are (a) it can be used in wind, (b) it can be used adjacent to water and desired plant life, and (c) it is generally considered efficient and economical. Some of the disadvantages are (a) the transport vehicle is limited to rather smooth surfaces, (b) the ropes must be kept clean, and (c) when stored for considerable time, the ropes must be kept out of bright light.

The front-mounted unit, weighing about 800 lb,

tends to make the tractor front heavy with a loss of traction in some situations, such as when the front-mounted unit is operated straight down from the face of a rather steep slope, and it becomes necessary to back up to turn around. The addition of weights to the rear wheels can generally remedy this situation.

The following table and other data represent a sample of the program evaluation of herbicides and speeds of application for the control of alfalfa on roadsides with a compensating feed rope applicator: date treated--July 2, 1980; date scored--July 15, 1980; plot size, 32 ft x 100 ft; replications, 3; herbicide dilution, 2 parts water to 1 part herbicide; method of scoring, 10 = complete control and 1 = no effect.

#### Expt. 4-H-7-80

Treatments	Speed of Application (mph)	Alfalfa Control Score
1. Roundup (3 lb ae/gal)	3	2.0
2. Roundup (3 lb ae/gal)	4	2.3
3. Roundup (3 lb ae/gal)	5	2.0
4. Weedmaster (1 lb ai dicamba plus 3 lb 2,4-D/gal)	3	6.0
5. Weedmaster (4 lb ai/gal)	4	5.7
6. Weedmaster (4 lb ai/gal)	5	5.3
7. 2,4-D (4 lb ai/gal)	3	1.7
8. 2,4-D (4 lb ai/gal)	4	2.0
9. 2,4-D (4 lb ai/gal)	5	1.7
10. Banvel (4 lb ai/gal)	3	5.0
11. Banvel (4 lb ai/gal)	4	5.0
12. Banvel (4 lb ai/gal)	5	4.3
13. Check	-	1.0

Significant differences	**
CV	13%
LSD.01	1.11

#### MOVING TREES MECHANICALLY George Wassenaar

(Wassenaar's presentation was not available for publication.)

#### EQUIPMENT TO IMPROVE HERBICIDE APPLICATION EFFICIENCY John Kubacak

Cibolo Manufacturing has developed a one-man operated herbicide sprayer called the Swinglok<sup>™</sup>. It is ideal for use by state highway departments, cities, and counties. It is capable of such diverse spraying operations as applying bareground herbicides under guardrails, signs on shoulders, selective treatments in the right-of-way, and foliage. The system attaches to the front bumper of the vehicle and incorporates special design booms for versatility and flexibility. This system allows for selective spraying up to 36 ft in the right-of-way. The spray swath consists of four 9-ft sections, each of which can be operated independently or in any combination by the flip of a switch on the dash-

mounted control panel. The Swinglok system eliminates the age-old problem of bending or breaking of long booms resulting from accidental contact with mailboxes, signs, and trees in the right-of-way. This system was designed to keep the spray truck traveling on the highway shoulder at a constant rate of speed to allow for precision application of herbicides. This system will allow maintenance departments to standardize spray equipment assuring maintenance engineers their herbicide program is the same with all spray truck operators. The Swinglok system is available in different models: (a) Model A--This system will spray one herbicide solution in a single pass down the roadside; (b) Model BS--This system allows the operator to spray two different herbicide solutions in separate operations either independently or simultaneously (e.g., spraying guardrails with bareground herbicides while applying selective herbicides across the right-of-way); and (c) Model S36--This system is used primarily for selective or brush applications.

#### EQUIPMENT AND THE MANAGEMENT OF ROADSIDES

Bill G. Morris

A major objective of the Florida Department of Transportation is the development and administration of a routine and preventive roadside maintenance program. To achieve this objective, it is essential that equipment capable of accomplishing the desired work in an effective and efficient manner be selected and used. We provide for continuous review of new equipment and, on occasion, provide for improved maintenance techniques. With the availability of funds diminishing, it becomes increasingly important that a fleet of cost-effective equipment be available to achieve the various tasks of roadside maintenance. Proper specifications and purchasing practices favor a fleet of performance equipment capable of meeting these needs.

A variety of specialized equipment is necessary to perform roadside maintenance functions. The selection of equipment is influenced by the type of terrain, climate, and soils that exist at a particular locality. Roadsides are predominantly turf and require varied techniques to perform routine and periodic work. Good turf is essential. Mowing represents a significant portion of the roadside maintenance activity, and it is accomplished generally with equipment in combinations of varying size.

In addition to mechanical mowing, we are now reviewing the potentiality of the rope-wick concept where herbicides are used to chemically mow. This system allows for the removal of the tall, unsightly competitive grasses and has potential for reducing mechanical mowing requirements. The herbicide program equipment consists of a 2-ton truck with an aluminum bed and front-mounted spray platform for workmen, which allows visual communication between the applicator and the driver. A sprayer is constructed on the truck and uses a variety of application systems to achieve the desired work. Periodic major turf renovations are performed on roadside shoulders and slopes to maintain proper grade and allow for proper road surface drainage. Tractor-mounted rotovators are used to till the soil, and grading is achieved by using motor graders. Spot shoulder repairs are performed by using a tractor equipped with a front-end loader and back blade. One piece of equipment performs the required grading and loads the excess materials. The majority of shoulder reworking sites receives an application of

hay mulch distributed by a truck or trailer-mounted power mulch blower. Tractor-mounted broadcast spinner-type distributors spread fertilizer over the site followed by the incorporation of seed and mulch into the soil. A tractor-drawn hydraulic controlled seeder-mulcher-roller with coulter blades and rubber tires is used to place seed in soil, cut in the previously distributed mulch, and provide needed compaction to the roadside area. Bituminous materials are placed on the mulch to control erosion. Routine fertilization work is accomplished by using bulk fertilizer distributors. These units are a minimum of five times more productive than alternate means of distribution. Proper drainage is essential to Florida's roads. Roadside ditches are maintained with hydroscopic excavators, mobile draglines, and herbicide units. Outfalls are maintained with track draglines and herbicide units having four-wheel drive when appropriate. Specialized equipment, such as tree spades, cranes, and well-point systems, may be leased or rented when these are determined to be more feasible.

Proper support equipment makes each roadside maintenance activity more productive. A fleet of diesel tractors with tandem trailers is maintained for the purpose of transporting equipment to varied work sites. Forklifts and yard loaders provide field activities with necessary materials in a timely manner.

Various manuals and employee training courses have been developed and are administered in an effort to improve the operating efficiency and effectiveness of employees and ascertain safe and proper equipment usage.

#### IMPACT OF "KEEP AMERICA BEAUTIFUL" ON ROADSIDE MANAGEMENT

William R. Nash

Nash explained the circumstances under which Keep America Beautiful, Inc., would work with the governing body to establish a program whereby the public would be made aware of the cost of litter and the associated problems. A plan was outlined whereby a town could decrease its litter problem considerably through a planned program of education and involvement. Successful programs have been carried out in 192 cities and counties across the nation. The Keep America Beautiful organization has a program development department, which along with field personnel stands ready to work with departments and agencies in designing efforts based on the "Clean-Community System" to identify the various factors that impact on the cleanliness of the roadside and how these factors might best be addressed.

#### LEAD COMPOUNDS IN MULE DEER AND VEGETATION

Larry T. Irwin

Studies of lead compounds from motor vehicle exhaust along with major highways have shown significant levels in vegetation up to 91 m away in small animals and in domestic livestock. However, little is known about the levels in wild ungulates, such as pronghorn antelopes or mule deer, which may use foraging and resting areas adjacent to highways.

Researchers found mule deer in certain areas to spend two-thirds of their time annually within 300 m