

Johnsongrass encroaching onto highway rights-of-way. Mississippi's johnsongrass control program begins about the middle of May in the southern portions of the state and nearly two weeks later in northern areas.

The Mississippi Method

A Weed Control Program

By JOHN L. SNUGGS*

We have encountered numerous obstacles in establishing a definite chemical weed control program for the Mississippi State Highway Department but, luckily, we have always been able to obtain the assistance of competent technical representatives from leading chemical companies in our area.

From the standpoint of selective weed control, the department began an experimental program of chemically treating undesirable roadside vegetation in 1964 under the direction of Lamar Hussey, former agronomist for the department. Not only did Hussey's initial chemical program prove to be successful and convincing; it also served as a guide for the other highway districts in developing their chemical weed control programs.

The year 1968 was probably the most significant year in chemical

weed control since that was when a continuous program of both broadleaf and johnsongrass control was first initiated by John McLeod, former agronomist for the Newton District. It was McLeod's tireless efforts which proved beyond any doubt that chemical weed control was here to stay and that it definitely deserved a place in the department's maintenance program. Our selective weed control program has now been expanded into all six districts with most emphasis being placed on broadleaf weed and johnsongrass (*Sorghum halepense*) control.

Problems

Probably, our most extensive weed problems encountered are found in the Mississippi delta especially since most of the soils there are very fertile. Almost every type weed adapted to the Southern U.S. will be found growing somewhere in the delta. Two of the most common and troublesome weeds found grow-

ing along roadsides in the delta area are dock (*Rumex spp.*) and johnsongrass; however, these two weeds are not limited to just this area and both are very prolific throughout the entire state of Mississippi. Another weed quite common in the delta and adjoining areas is coffeeweed (*Sesbania sp.*). Two unsightly broadleaf weeds commonly occurring along roadsides over the entire state are sowthistle (*Sonchus sp.*) and Canada thistle (*Cirsium sp.*). These two weeds produce small seed that are scattered many miles by wind and water.

In Roadside Development, our main concern actually centers around performing erosion control over the highway right-of-way by providing both a temporary and permanent vegetative cover usually in the form of selected grasses, shrubs, or trees. Our main grasses used for establishing permanent vegetative cover on new construction projects are bermudagrass (*Cynodon dactylon*), bahiagrass (*Paspalum notatum*), tall fescue (*Festuca arundinacea*), and weeping lovegrass (*Eragrostis curvula*). Crimson clover (*Trifolium repens*) is used to a lesser degree, primarily for temporary erosion control during the winter months.

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*The author is Mississippi's Manager of Roadside Development headquartered at Jackson.

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tion is taken over by state maintenance forces, the weed problem then becomes ours. Desirable grasses are then on their own since we do not ordinarily supply additional fertilizer on vegetation after the contractor is released from his responsibility of maintaining an area. These grasses are often planted on steep slopes that have no topsoil whatsoever; and, consequently, the only plant nutrients contained in these soils are those supplied by the contractor at planting which usually last from six months to one year. Along come numerous weeds and compete with the desirable grasses for sunlight, moisture, air and nutrients. A potential erosion problem is then staring us in the face. We must then decide on performing some type of selective weed control in order to eliminate the undesirable vegetation but leaving the desirable vegetation to perform its job. We try to develop a general plan of action which includes:

- Identification of specific weed problems
- Selection of the proper herbicidal treatment
- Utilization of proper equipment and trained personnel
- Strict observance of all safety precautions
- Follow up on all work

Equipment

It would be virtually impossible to give a comprehensive review of all the different types of equipment we use for applying herbicides. Some of the units are homemade and were transformed into spray rigs from war surplus material; thus, you might expect that we have experienced numerous mechanical problems from time to time using these rigs. Our most expensive equipment at the present is the ultramodern invert units that we use in both the broadleaf and johnsongrass control programs. We now have four of these units located in three of the six districts that comprise the state of Mississippi. These units enable the operator to reduce the drift problem, thus, covering a uniform spray pattern approximately fifteen feet more than is accomplished by the conventional type units. The invert unit forms a water in oil emulsion whereas the conventional unit forms an oil in water emulsion. The result is a spray particle formed with greater density and viscosity with

the resultant advantages previously stated. All of our invert units are permanently truck-mounted as are most of the conventional units; however, we do have some tractor rigs that are used in areas inaccessible to trucks. Our conventional units use a boomless nozzle cluster for delivery of the spray material. Due to all the numerous and various types of obstacles confronted along most highways, it would not be practical to use a boom. Most of the tanks on the conventional units have a capacity of 1,000 gallons.

Our spray crews must thoroughly familiarize themselves with the specific type equipment being used in order to obtain maximum performance and, thus, achieve good results. Only when the equipment operates properly can we expect to obtain satisfactory results.

Broadleaf Control Program

The primary target of our broadleaf weed control program is dock and thistles. Wild garlic (*Allium vineale*), kudzu (*Pueraria lobata*) and Japanese honeysuckle (*Lonicera japonica*) are problems in some areas of the state but are not considered to be as serious as the dock and thistles. This type treatment ordinarily is accomplished by using the hormone-type chemicals — 2,4-D and 2,4,5-T. The rates of application for control vary from one to two pounds active material per acre. We have used primarily the amine formulation of 2,4-D for conventional application with varying results; however, we have also had success using the ester formulation especially during the month of February when temperatures are still rather cool. We do not use the ester formulation after row crops and gardens are planted due, of course, to its high volatility. This past year, we made extensive use of an invert formulation of 2,4-D in our invert spray equipment which helped reduce drift and offset some adverse climatic conditions.

We have found that the success of the broadleaf weed control program is much more dependent upon climatic conditions than the other chemical programs. Fluctuating temperatures, high wind, and excessive rainfall all have severely hampered our broadleaf program on several occasions in the past.

Johnsongrass Control Program

Most of our emphasis on chemical weed control in the past has been

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on controlling johnsongrass; and, consequently, this is the area in which we have had our most success. Most of our experience in treating johnsongrass has been with the organic arsenicals, primarily MSMA. We have experimented considerably using MSMA by varying the rates as well as the formulations. Experience has revealed that in order to be successful in a program of this nature, we must perform these treatments according to location, season, and climatic conditions.

Ordinarily, our johnsongrass control program is initiated about the middle of May in south Mississippi and about two weeks later in the northern portion of the state. We have found that the seedling johnsongrass can be almost completely eliminated by one or two treatments provided the treatments are performed at the proper stage of growth and climatic conditions are favorable. The rhizome johnsongrass is another matter and occasionally takes not less than two treatments per year over a period of three years to provide satisfactory control. Once an area is satis-

factorily rid of johnsongrass, it must be observed for possible reinfestation from adjacent landowner's property and spot treatments must then be performed to keep down the johnsongrass.

Upon initiating a johnsongrass control program in an area previously untreated, we try to follow a general recommendation we have developed during the past five years. Assuming the areas involved to be heavily infested, we plan on performing three MSMA treatments the first year at intervals of approximately six weeks. We normally use a rate of three pounds MSMA per acre which is usually sufficient to kill the foliage of the johnsongrass without harming the desired grass such as bermudagrass. The second year of treatment involves two treatments of MSMA at the three pound rate. Ordinarily, these treatments would be performed in June and August or as local conditions dictate. By the third year, only one treatment should be required over most of the areas previously treated; however, some spot treatments will be necessary due mostly to factors beyond our control. After the third

year, some spot treatments will still be necessary; but for the most part, we feel that the worst part of the problem will have been solved. Our main problem in carrying out this continuous johnsongrass control program has been getting over all the intended areas each year with the desired number of treatments. This has been due in part to a lack of proper equipment and trained personnel.

One noticeable side effect in using MSMA to treat johnsongrass has been a partial elimination of bahiagrass in favor of bermudagrass, which ordinarily is not damaged by MSMA. Since the bahiagrass is well-adapted to south Mississippi and johnsongrass is less apparent in this area, we do not anticipate any great problem over the loss of some of our bahiagrass. We are fortunate that bermudagrass is well-adapted over the entire state.

We definitely believe that our selective chemical weed control program has proven to be worthwhile even though we have met with some failures, especially in the early phases of the program. The need for any mowing has been eliminated on some sections of secondary routes in the two central districts of the state; however, it should be stated here that our ultimate goal is not the complete elimination of mechanical mowing, for even where we have completely pure stands of bahiagrass and bermudagrass, there will still be a need for some mowing in order to provide a neater and more uniform appearance, especially in and around urban areas. We believe that by using a combination of mechanical and chemical control methods, a much more attractive roadside will be the result.

The Mississippi State Highway Department has a graduate agronomist or horticulturist who is located in each district, and it is his responsibility to carry out the chemical weed control program plus a number of other duties. One problem that we have encountered is that some of our men have become so well-trained in using chemicals that they are hired by large chemical companies; therefore, a new man has to be hired, and as a result, a successful chemical program may be temporarily interrupted since it usually takes a man at least two years to become thoroughly familiar with the various phases of chemical weed control.

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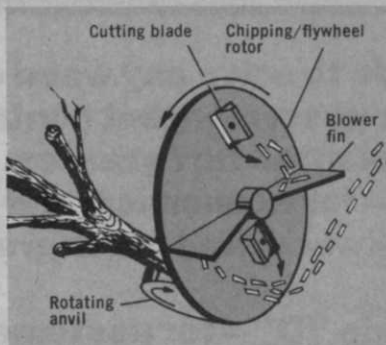
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ISTC (from page 10)

- "Shade tree evaluation," Dr. L. C. Chadwick
- "Interpretation and use of the ISTC shade tree evaluation formula," Frederick R. Micha
- "Should hardness zones and location be made a part of the ISTC shade tree evaluation formula?" J. James Kielbaso
- "Viewpoint of IRS and insurance agencies fo shade tree values," Ray Gustin, Jr.
- "American Society of Consulting Arborists recommendations for modification of the ISTC shade tree evaluation formula," Dr. L. C. Chadwick

Thursday, August 22:

Morning and afternoon:

Four concurrent educational sessions

Session I — Utility Arboriculture

"Utility Beauty — Environmental Planning and Design,"

President-elect I. O. Bauer presiding, D. E. Holewinski, James H. Parsons

"No Spray R/W Maintenance," G. A. Kihl presiding, Dwain Bird, Jim Gibbs

Committee reports and election, President W. Jenkins presiding

Utility Arborists Association Luncheon: Wade Manning, speaker

"E. E. I. Research," Dr. Kenneth L. Carvell

Panel Discussion — "2,4,5-T hearings," H. M. Collins; "Tandex," P. King; "Banvel," C. Middleton;

"Crenite," E. I. DuPont; "Tordon," Ron M. Townsend

"Tree injection," Leo Creed

"Green Industry Council (federal licensing)," Hyland R. Johns, Jr.

"O.S.H.A.," Jack Brown

Noise abatement

Recap, R. E. Abbott

Session II — Municipal Arboriculture

"The essentials of municipal tree care," James T. Oates

"Safe use of pesticides according to federal guidelines," Hyland R. Johns, Jr.

"Urban and city tree programs and problems," John Mixon

Field trip of Atlanta's plantings and municipal facilities

Session III — Commercial Arboriculture

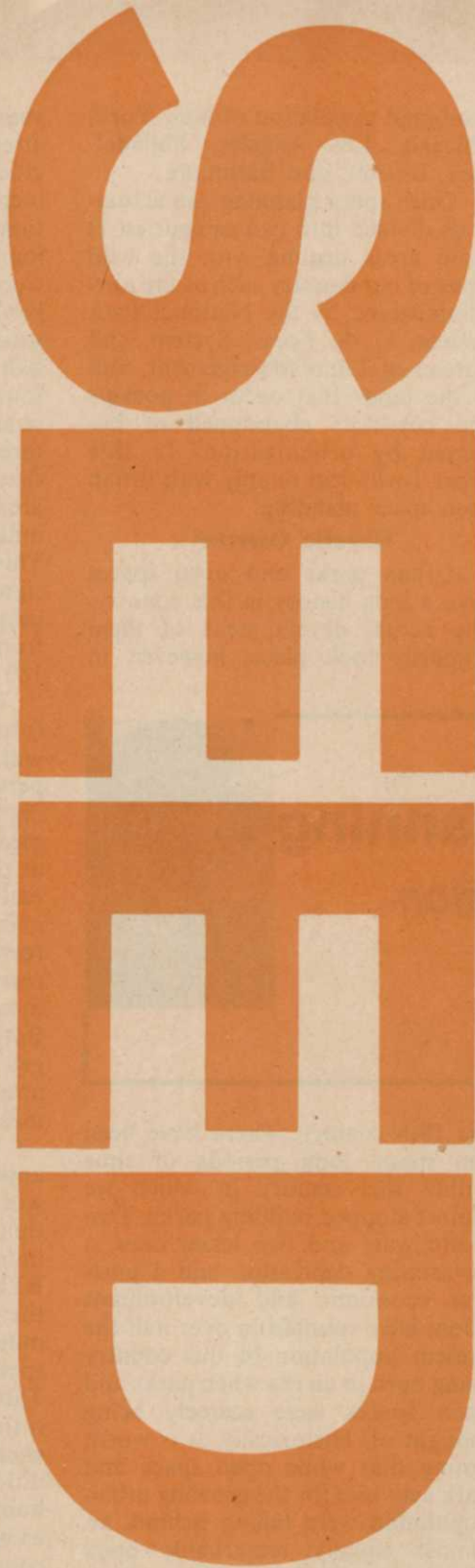
"How to manage an arborist's business," Robert Felix

"Labeling and restricted pesticides," Henry Pratt

"Disposal and storage of pesticides and new EPA regulations," Hyland R. Johns, Jr.

"An efficient business system will increase your profits," Safe-guard Business Systems

(continued on page 49)



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Open space planning can actually be divided into two categories: 1) those areas dealing with the wild lands of our country such as are now administered by the National Park System, U. S. Forest System, and Bureau of Land Management, and 2) the lands that occur in pockets and corridors abandoned or bypassed by urbanization. In this paper I will deal mainly with urban open space planning.

Historic Overview

Urban parks and open spaces have a long history in this country. The actual development of them primarily took place, however, in

years ago The National Park Service attempted to convince the major cities and towns of this country to increase the open space and recreational facilities within and surrounding these urban areas. In other words create new and revitalized urban parks and open space systems to satisfy the recreation demands of urban dwellers. This plea was largely founded on the increased strain of overuse the national parks and forests were feeling. Statistics show that in the past decade the total park area increased from more than 26 million acres to about 30 million. This increase, however, becomes insignificant compared to the visitor usage which jumped 150 percent from more than 72 million to almost 180 million.

There is some abatement in the form of gasoline shortages which will no doubt restrict the amount of personal automobile pleasure driving for any great distances. This may mean a reduction in terms of impact at the national park level but more realistically means a shift in usage, and demand, to local and state recreation areas. This change of recreation use could greatly increase mental stress of urban dwellers. Both because of lack of mobility to get to parks and recreation areas and the increased contact with masses of people.

Yet another second-order crisis appearing on the horizon linked with the lack of open space recreation areas at the local level and immobility is that of an increase in BTU and kilowatt hour usage. With the steady increase in leisure time more people will potentially be spending many more hours at home. This then could have a significant influence in terms of increased energy consumption to run air conditioners, television sets and radios, home cooking, water use, lighting, as well as various outdoor tools and equipment. Many of our major cities have already been experiencing for years electrical power shortages during the summer months.

Social and Physical Integration

Urban open space today cannot be thought of as a land use separate from other activities within the city. There must become a conscious effort to integrate open space and park development with patterns of urban movement, air rights, and areas for living, shopping and working. Social and physical planning

Our cities are entering a new era of conflict that has the potential of being the crescendo of several major environmental crises. One issue, air and water quality, has and will be of principal concern whereas another

Urban Space Planning Room for Recreation

By GERALD L. SMITH
Utah State University
Logan, Utah



will gain attention dealing with the mental health of the urban dweller. The demand for more open spaces in and surrounding our cities has risen sharply in the last few years. This has come about because of the increasing need for energy conservation placing restrictions on the freedom of individuals and families to travel by personal automobile. There is every indication that this demand will not slacken.

Cities are becoming larger, in many cases against the wishes of the government and the pressures of the strongest governmental actions that can be brought to bear against them. A great many people are distressed by this trend and believe that it will ultimately crush us all in a mass of people, concrete, traffic, and polluted air. A somewhat smaller, but growing group is worried about what it will do to man's mental health and sense of personal identity. By the year 2000 more than 80% of the increase in our population will live in urban areas. Within the next 15 years 30 million people will be added to our cities. This additional population is equal to the

the 19th century. There have been too many long periods of time within this century in which we almost stopped building parks. Two world wars and two lesser ones, a devastating depression and a post-war economic and development boom have resulted in over half the present population of this country being born in an era when parks and open spaces were scarcely being thought of. Historically, it is worth noting that while open space and park activities for the growing urban population were falling behind, an almost equally remarkable open space acquisition was taking place. The American conservation movement was making far-sighted advances in its success of setting aside large areas of land for a great system of national parks — mostly in the western part of the U. S. but now a growing number in the East. But to this day this land ethic has never been translated into the urban community. Our planning processes simply do not yet recognize the geographics of cities and neighborhoods, of parks and open spaces.

Approximately three to four

must become a single process.

Historically, open space has been thought of as wilderness or parks, playgrounds and roadside areas. This definition, however, must be changed to one that is more flexible with the direction being toward an open space that is adaptable to a multitude of uses (Central Park in New York City or Golden Gate Park in San Francisco).

There has been a recent rebirth of the value of linear open space. These areas, or linkages, can be multi-purpose in the sense of offering not only easy and safe corridors from park to park or home to school and shopping but also sitting areas, small play lots, fishing, birdwatching, bicycling, bridle paths, etc. The land that could comprise this form of open space might be canals, stream beds, flood plains, old rights-of-way, trails, and little-used secondary roads. When aggregated, it can become rather sizable in acreage and offer a very diversified set of recreation activities within easy access of urban dwellers.

We see several parks, large and small, in cities today and they stand out on a city map as green emeralds in an otherwise patchwork of land use colors. They are isolated except for the immediate neighborhood around the park. Access is almost solely by automobile or mass transportation, when it exists, for those people in other sections of the city. By developing a linear open space system threading throughout the city by the means mentioned above, accessibility could be offered to the entire city along with the side benefits gained from many uses occurring along the corridor system itself.

People to the Parks

One of the primary words in

physical planning of our cities is mobility. The Secretary of the Interior has been studying efforts to locate state and regional parks and open spaces closer to the major urban centers. This is being done in conjunction with state and locally subsidized mass transportation systems to increase accessibility of parks and open spaces outside our cities to low income — mostly immobile — central city families. The State of Utah, like most states, has recently passed legislation offering the opportunity to increase sales tax to help finance this type of state-wide transportation system.

There should be an immediate program of action initiated and the first step should be the establishment of a broadly expanded and accelerated open space acquisition program. Through effective planning processes the acquisition of open space must be related to patterns of urbanization. The need is for open space to occur where high concentrations of people are; land which is accessible physically, psychologically, and socially.

The old fashioned concept that parks could not be provided for in our densely built-up cities because of lack of land is simply not true. A study of the ten largest cities in the country revealed that, on the average, 20% of the city is undeveloped and uncommitted land. Some open space strategies, along with this statistic, being promoted recently are concerning the reclamation of valuable natural tracts of land which exist within or near urban areas for public use. These would include river fronts, harbors, old military installations, and other types of federal lands. Other newly found areas involve air rights above already existing land uses such a sewage treat-

ment plants, downtown expressways, roof tops, etc.; closure of little used streets; conversion of cemeteries to memorial parks.

Central Park, Golden Gate Park, Boston Commons, Chicago's lake front are among the legacies of open space bequeathed to today's generation by the foresight of late 19th century planners such as Burnham, Olmsted, Cleveland and Jensen. Let us hope that the next few generations can have the same chance to have such open space systems in existence to enjoy.

"That these wild lands shall live and bloom for 10,000 years to come, is our dedication to human culture and our legacy to our children, so that they, on a warm spring day, can feel peace in a sea of grass, watch a bee visit a shooting star, hear a sand-piper call in the sky, and understand the incomprehensible symphony of life."

Dr. Hugh Iltis

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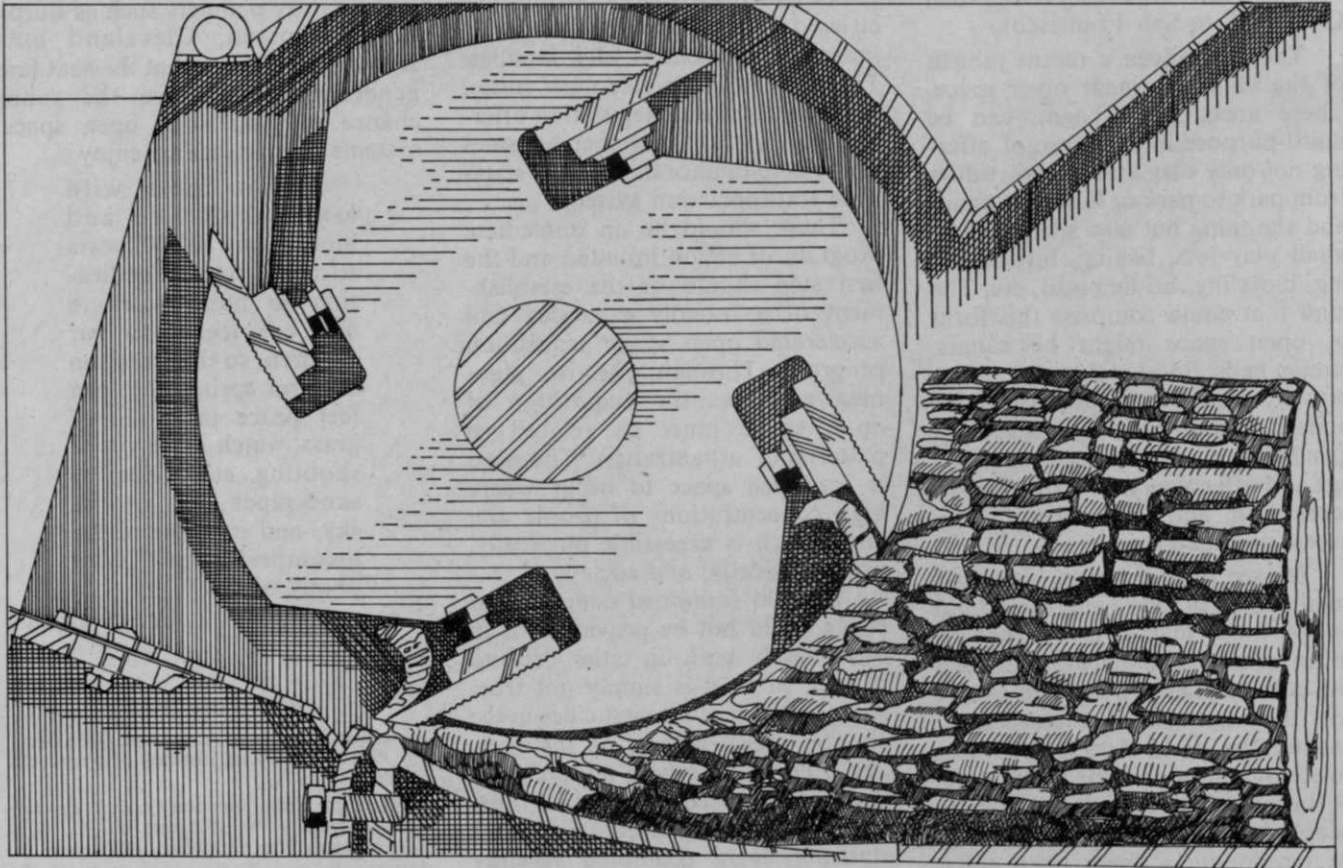
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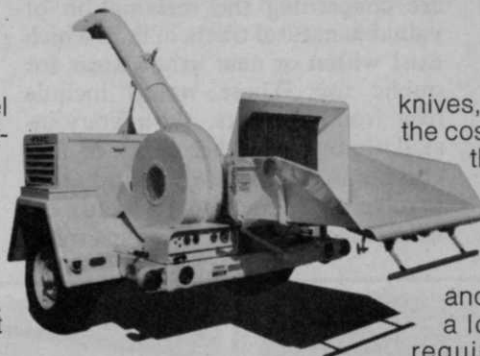
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