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TO INDUSTRY, weeds are more than an eyesore. They are the itch that affects the daily maintenance, efficiency, and safety of operations. Every industry has its own vegetation control needs and problems which are unique to its type of operation. Fortunately, with the variety of safe chemicals and treatments marketed, vegetation control commensurate with this need can be programmed for the customer.

In a nutshell, industrial weed control today is a "prescription science." Programs are prescribed that solve the vegetation problems of many industries classed as industrial markets. This analysis requires an understanding of the customers' problems, a knowledge of the herbicides commonly used and labeled for industrial uses, being conversant on vegetation species and agronomic conditions associated with their growth and the ability to assist the customer to see that the applications are made properly and at the right time.

Type of Control Desired

Methods of vegetation control applicable to various problems in industrial weed and brush control

markets in southwestern United States include:

1. **Clean ground**—The use of soil active herbicides such as "Hyvar" X bromacil weed killer or "Karmex" diuron weed killer at such rates that all plants are controlled for at least one season with continued control possible at about one-half of the rates. Initially it is the most expensive of the weed control treatments, \$100 to \$400 per acre, but each succeeding year costs are markedly reduced. These costs vary due to different areas of the country, rainfall, vegetation species, and soil type.

2. **Abatement weed control**—Usually a residual type herbicide such as "Hyvar" X bromacil weed killer or "Karmex" at one-third to one-half of the rates needed for clean ground plus a strong contact or systemic herbicide such as Dalapon or sodium chlorate and a surfactant are combined and applied to control weeds during the peak of the growing season, at a cost of \$75 to \$100 per year in southwestern areas.

3. **Selective Weeding in the South**—Selective control of tall growing annuals and perennials and their replacement by Bermudagrass shows promise in tests with two to three applications of low rates of "Karmex" (1 to 2½ lbs) or "Hyvar" X (¾ to 1 lb.) plus MSMA or DSMA

and a surfactant. Annual cost in areas where the growing season is year-round are about \$75 to \$100 per year.

4. **Chemical Trimming**— This is an application, on a postemergence basis, of a contact herbicide to knockdown vegetation in areas containing roots of valuable trees where soil active herbicides cannot be used. Costs per application vary from \$25 to \$50 per treated acre because of differences in species length of growing season, rainfall and other factors.

5. **Woody Plant Control**— Brush can be controlled with summer foliage applications of "Ammate" X weed and brush killer or phenoxy herbicides. Other methods of treatment are dormant cane with phenoxy herbicides and stump and frill treatments with either the phenoxys or "Ammate" X. Soil applications of "Hyvar" X or "Dybar" fenuron weed and brush killer pellets are also effective on many brush species.

The cost of a treatment is determined by the cost of the chemicals, the application availability of water, the accessibility and size of the area to be treated as well as the type of vegetation control desired.

The appropriate chemical to use depends on: (1) degree of control desired or needed, (2) type of vege-

Here's an Estimate Of Weed Control Costs In Long-Season Areas

Railroad beds treated with modern herbicides can be weed and brush free. Yards are cleaner, promoting safety and improved efficiency by maintenance personnel.

tation, (3) equipment at hand, (4) availability of manpower, (5) chemicals required to get the job done.

Technical Support Expected

The industrial customer should expect technical support from his chemical suppliers and custom applicators in the selection of the proper chemical, advice as to correct timing of the application, and assistance in assuring proper application of the treatment.

First, a comprehensive survey of the problem is needed to decide what chemicals to use and what rates to apply. In the course of this survey, climatic conditions should be recorded; soil studied as to type and organic matter content; species, density, and height of vegetation studied; surrounding areas charted; equipment inspected to determine what modifications may be necessary; analysis of the size and proximity of area to be treated; sources of supplies needed for the application; and results the company expects to receive.

Major Market and Problems

It is well established that the degree of control needed by diverse markets varies due to the need and/or economics. Some of the ma-

ior markets and their problems include:

1. **RAILROADS** — Treatment of road beds probably represents the greatest return on investment to railroads from the standpoint of protecting their maintenance dollar. For \$50 to \$75 per mile, a railroad can protect a \$2,000 to \$4,000 per-mile maintenance investment with an effective road bed vegetation control program. This usually involves the use of a residual, a translocated and possibly a contact herbicide applied once or twice during the growing season. Weeds in the ballast section may cause poor drainage of the ballast which is pertinent to the condition and safety of the road bed. Wavy track, faster deterioration of ties, and poor ballast are results of poor track drainage.

Railroads need bare ground under bridges and trestles, on industrial sidings, around signals and switches, and in some storage yards. Dry chemicals as well as sprays are used. Herbicide costs up to \$200 per acre may be requested for bare ground treatments. The major concern is to protect these facilities from fire.

In yards, a chemical treatment that results in clean ground is often desired. Some railroads are satisfied with an abatement program of achieving bare ground over a two-

or three-year period. The elimination of fire hazards, reducing employee complaints, and ballast drainage are the major concern here.

Many states now have laws setting standards on vegetation heights at crossings. A selective weeding program to control tall species and promote the development of low-growing grasses involving costs up to a maximum of \$100/acre/year, and is usually accomplished with cost in the range of \$50/acre. Mowing costs are greatly reduced.

Right-of-way brush control facilitates inspection during movement of trains at curves, prevents brush from encroaching onto the railroad tracks, and protects communication lines. Costs vary from \$30 to \$60 depending on the geographical location.

Bindweed, Canada thistle, musk thistle, Johnsongrass, bur ragweed, leafy spurge, and Russian knapweed, are classed as noxious by several states. Laws requiring their control have been recorded. All require the use of specific chemicals timed to obtain the optimum control.

Many counties, cities, and municipalities also have laws regulating the height of vegetation to be allowed on the railroad rights-of-way within city limits or in urban areas. Herbicides for trimming and rotary



Utility companies are realizing great savings in manpower and dollars by using herbicides to chemically trim trees and brush along rights-of-way. Here, herbicides are sprayed on foliage adjacent to power lines.

mowing machines are used. Chemicals used must not volatilize and should be applied when atmospheric drift is not a factor. Also, they should be low in toxicity to man and animals. Costs for areas in the Southwest range from \$15 to \$25 per acre.

2. HIGHWAY WEED CONTROL

—Increased costs, more road mileage, and decreased availability of manpower to cut weeds demand that chemical methods be used to control vegetation on roadsides. Herbicides are a necessity and their use is now accepted practice in many areas of the country.

The successful and economical highway vegetation control program utilizes both the mechanical and the chemical methods on a well-planned and coordinated basis. The overall objective is to beautify highways with smooth, green turf, free of tall, unsightly weeds.

Conversely, bare ground is desirable in storage yards, at bridge ends, around signs and markers, mailboxes, and under guard rails, and fences. But care must be exercised in the use of soil-active herbicides to prevent erosion problems on steep slopes and damage to roots of desirable trees. Adequate control can be obtained by using reduced rates of soil-active herbicides plus a systemic or contact herbicide and a surfactant, at costs of \$50 to \$75 per treated acre in southwestern states.

On road shoulders and medians, an abatement program is usually adequate. In the southern areas this prevents Bermudagrass encroachment and controls annuals and perennials whose root system might cause rapid erosion of the asphalt.

On the rights-of-way, use of selective chemicals and brush control materials may be used to reduce the frequency of mowing and improve highway beautification. Some of these materials may present volatility hazards; therefore, regulations regarding their use must be observed and necessary precautions taken to circumvent damage to valuable off right-of-way property.

Other special treatments employed by various highway departments are: chemical control of poison ivy and poison oak in parks, chemical trimming around trees and shrubbery beds, and interstate fence line control. These treatments can be made chemically at a fraction of the cost of hand cutting.

3. THE PETROLEUM INDUSTRY

—Weeds pose serious problems to the petroleum industry. They directly affect the maintenance, efficiency and safety of operations. The enormous cost of petroleum facilities necessitates that weed eradication or prevention be obtained to eliminate fire hazards around storage tanks, processing equipment, valve manifolds, compressors, along rod lines, in pipe yards, in storage areas, at meter settings, and around pipe-

line markers. Labor rates at the present high levels make hand control uneconomical. So, the use of herbicides is standard procedure.

Many open rights-of-way are still being mowed with rotary cutters. In other areas the use of selective weed control chemicals has been employed with economic success. Experience is proving that this treatment controls woody plants, also. As the undesirable species are controlled and grasses become established, the right-of-way becomes more accessible. Properly maintained, grass cover controls erosion and improves the efficiency of pipeline crews.

The use of a contact herbicide for side trimming of branches encroaching over the rights-of-way is a new practice that seems to offer cost reductions of almost 50% over hand trimming, depending on height of the trees, density and length of limb encroachment. Ammonium sulfamate is widely used because it is non-volatile, translocates only to a limited degree and is highly safe to man and animals.

4. UTILITY WEED AND BRUSH CONTROL

—Trees and brush create operational problems by disrupting or interfering with communication lines. Hand cutting is expensive for utilities. In some areas, rotary cutting is practiced on transmission lines, particularly in areas with flat, wide open rights-of-way which are free of stumps and stones. Most util-



Bare ground around storage tanks from application of soil active herbicides eliminates fire hazard and boosts maintenance efficiency at petroleum refineries.



Clean shoulders on modern superhighways are kept weed-free with short-residual herbicides that enable landowners to plan housing or industrial developments without limitation.

ity brush control programs, however, involve the use of mechanical and chemical methods of control, with the chemical applications being made to stands of brush growing in areas where the terrain is not level. The cost of a chemical brush control program to utilities is determined by species, density, accessibility, and height of brush. There are many treatments that are currently being used. Some include:

a. Summer foliage sprays of phenoxy herbicides and "Ammate" X weed and brush killer.

b. Basal Treatment—The application of "Hyvar" X-P bromacil brush killer or "Dybar" fenuron weed and brush killer or Tordon in pellet form at the base of the plant, phenoxy herbicides in oil applied to the stem and base of the plant.

c. Aerial Applications — Usually restricted to areas inaccessible to ground spray equipment.

d. Dormant Cane—Phenoxy herbicide applied to canes of dormant plants in the wintertime in areas where valuable crops make spring or summertime application non-feasible.

A long-range program might be:

a. Initial applications — Summer foliage spray using "Ammate" X in crop areas and the phenoxy herbicide or trichloropicilinic acid in non-crop areas.

b. The third or fourth year, treat remaining species with one of the formulations of "Hyvar" or a 4% phenoxy in oil basal treatment.

c. Sixth or seventh year, clean up with pelleted herbicides.

d. Re-treat as necessary on spot basis with pelleted herbicides.

Utilities also have a need for complete control of vegetation in pole yards, substations, storage yards, parking areas, scalping at the base of poles and around pedestals. One application per year usually will suffice.

Side trimming offers considerable promise in reducing maintenance costs. This treatment may only be practical in rural areas and certainly will not eliminate tree trimming. However, where applicable, it could mean substantial savings (up to 50%) to utilities over the hand method.

5. PLANT SITE VEGETATION CONTROL—A better looking plant not only improves community relations but also boosts employee morale. Employees take pride in the plant's appearance and more importantly, may perform their jobs more efficiently. Tall weeds dry in the fall to form serious fire hazards. During summer months they clog ditches, hampering drainage and form mosquito breeding areas. Two methods of vegetation control normally employed on plant sites are

bare ground and chemical trimming for control of vegetation growing under fences, around flower beds, along shrubbery borders, along buildings and areas where roots of valuable trees extend. Lawn areas are usually improved and mowed.

6. CITIES, MUNICIPALITIES AND PARKS—The high cost of labor as well as the need for beautiful facilities is sufficient incentive to make management personnel consider the use of herbicides. The use of soil-active herbicides is restricted to storage yards, around the base of telephone poles and signs, in pavement and asphalt cracks, beneath some overpasses and around fire hydrants when such areas are not near root systems of valuable trees.

Selective weeding programs along roadsides and drainage ditches, would maintain the desired degree of vegetation control, encourage the establishment of Bermudagrass to reduce erosion problems and improve the beauty at a cost of one-half or less of hand programs.

Weed control technicians must assist top management to operate their plants at optimum efficiency with the greatest of safety. It is their responsibility to properly satisfy the customer's needs. Therefore, long-range vegetation control programs that will do the best job, the safest, at the lowest possible cost must be developed.