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Sunburst Thermal Weed Control Technology

Sunburst's unique, proprietary equipment* applies a thin film of water to unwanted vegetation and then subjects these plants to at least three forms of intense heat in an enclosed space (1. infrared energy; 2. turbulent hot air - between 800°F & 2000°F; and 3. boiling water – most of the water sprayed on the surface of leaves and stems prior to heating them is vaporized under the housing].

In addition, the hot steam created by the evaporating water also circulates inside the thermal deck – adding to treatment impacts while helping avoid unwanted burning and smoke. Further, depending on application conditions and configuration of the thermal unit, treated target vegetation may also be exposed directly to the flames used to generate the intense heat produced by Sunburst's equipment.

Subjecting vegetation to high temperatures (i.e., 132°+F) for at least 3 seconds coagulates proteins and ruptures cell walls, thereby disabling normal plant functions.

This impact effectively kills all types of seedling weeds outright, and with repeated applications, can eliminate even well established plants.

On Sunburst's large units, independent perimeter spray systems can be used as needed to apply water along the sides and rear of the equipment to help prevent ignition of flammable materials adjacent to or behind the thermal unit.

How Sunburst's Equipment Differs from Other Thermal Technologies

Historically, vegetation management through the application of fire has been widely used over a long period of time, principally for agricultural and wildlife management purposes. In recent times, a variety of thermal treatment systems have been developed specifically for weed control as an alternative to the use of herbicides, with varying degrees of success.

Typically, these modern technologies have focused almost entirely on one particular type or method of applying heat to vegetation (systems using open flame, steam, hot water, or hot foam being the most common).

Although these systems can be effective for managing vegetation, most require large volumes of water and/or energy, many are mechanically complex (high maintenance), and some are cumbersome to operate in the field. Foam systems also require the purchase of special additive materials, while flaming systems without water or foam involve the hazard of unwanted fires.

* (US Patent #6,363,654)

However, Sunburst's unique "wet infrared" system provides weed control benefits unavailable from other equipment: Sunburst's technology is thermally sophisticated (generating multiple thermal treatment methods simultaneously), it facilitates treatment impact by subjecting target weeds to different types of heat, it efficiently utilizes the heat that is created, and, it requires less fuel to achieve effective impact.

Along with the use of advanced insulation materials in construction, these factors make Sunburst's equipment highly fuel-efficient. Specialized control devices for the propane system provide for safe operation at all times.

Sunburst's equipment has also been carefully designed with respect to the use of water: four separately controllable application systems are available on our large units. This allows independent operation of each system at any particular time (i.e., only as needed). Further, the use of very low volume nozzles minimizes the amount of water applied. Together, these factors make Sunburst's equipment highly water efficient (i.e., Sunburst's equipment applies only a few dozen gallons per acre: the amount varies with the size of the unit - which determines the number of nozzles, and, the need to utilize each of the individual application zones - frequently only the front zone is required.) On the other hand, conventional water and foam systems use hundreds and even thousands of gallons of water per acre.

In addition, while thermal weed control systems that involve the application of hot water or foam must heat their liquids prior to application, and many of these use highly pressurized systems, Sunburst's technology can use water at ambient temperature and applies it at low pressure. This reduces equipment complexity and maintenance needs while increasing operator safety by minimizing equipment requirements and system specifications (i.e., costly high pressure pumps, compressors, heaters, hoses, fittings, etc. that are found on many systems are unnecessary on Sunburst's equipment).

Furthermore, Sunburst's unique and patented surrounding water application systems also provide unparalleled options for responding site specifically to the potential for unwanted ignition of flammable materials adjacent to or behind the thermal unit.

Practical Application of the Equipment

Under average routine maintenance conditions (i.e., *when controlling seedling vegetation on sites that receive regular vegetation management treatments*), 1-4 applications per year can keep areas virtually weed free (site conditions and an individual's standards or goals for weed control will determine the actual number of treatments needed).

Where perennial plants are well established, 4-6 treatments per year may be necessary to provide an adequate level of control; complete eradication may require up to 8 applications or more. The number of treatments needed will depend on site conditions, weed species, weed density, and weed control standards. Therefore, while Sunburst's equipment can be used to manage well-established vegetation, *it is not recommended for this purpose alone* unless other tools are not feasible.

Still, that *recovery* or *rehabilitation* of intensely weeded sites can be achieved solely with Sunburst's equipment can be a valuable and important treatment option and demonstrates the broad opportunities available for vegetation management using thermal methods.

Timing of treatments is critical and must be thoughtfully coordinated with seed germination cycles and regrowth of any survivors of previous treatments. Note: Fall and even Winter treatments can be very effective as part of a routine thermal weed control program and should be included in treatment trials to determine an optimal thermal application schedule.

Mechanical maintenance practices, which are very often a routine or standard procedure in many vegetation management programs, can significantly reduce the need for thermal weed control treatments and improve their cost-effectiveness (e.g., scarification and dragging for baseball infields; shoulder blading for roadsides; ditch pulling for channels and culverts; ballast regulating and tie tamping for railroads; pre- and post-planting soil treatments in agricultural operations). Therefore, a high level of weed control with minimum treatments can be achieved when the use of Sunburst's equipment is coordinated with the application of routine mechanical site management practices.

Sunburst's equipment is currently optimal at speeds of 1-3+ mph, depending on vegetation types and densities as well as equipment configuration (principally, its length). Longer units allow greater application speeds, however, the size of Sunburst's units is limited by practical and operational considerations.

Very importantly, the distribution of weeds in most management settings is usually not uniform (i.e., weed populations are often scattered, with most individuals growing within dispersed groups of plants), particularly where weed control and/or mechanical practices are routinely applied. This dynamic creates "no-treatment" zones between the areas where the majority of weeds occur. Quite often, these very sparse or non-weeded areas are extensive (e.g., roadside shoulders, railroad ballast).

As a result, on some applications sites, equipment operators can skip or work rapidly over areas that need little or no treatment – thereby increasing average working speed to 5 mph or even considerably more.

Summary

Sunburst's technology is a distinctive and valuable improvement over previously developed thermal weed control systems. It utilizes several forms of heat at one time, and is more effective and efficient but less cumbersome and hazardous to use than any other system available today for non-chemical, broad scale, non-selective vegetation management.

Sunburst's advanced equipment design and use of high quality, state-of-the-art materials and components not only provide results, but longevity and durability that will give the user years of low maintenance operation.