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Maintenance and Management of Conservation Plantings

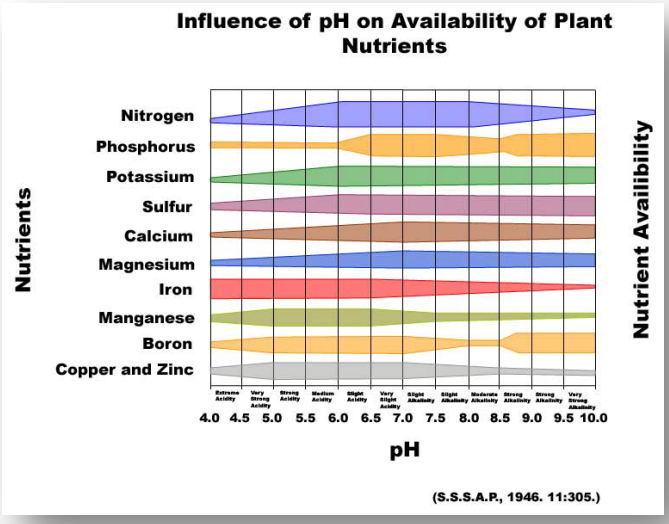
Plant Materials Tech Note

Introduction

Proper maintenance and management are critical for successful establishment of conservation plantings such as, but not limited to; reestablishment of native plants on previously cropped lands, vegetative barriers for windbreaks, nutrient uptake, and soil erosion, and the establishment of native plant species for livestock and wildlife habitat. Poorly managed or maintained plantings often result in weak stands which fail to meet conservation goals and waste resources. Warm season annual weeds can be very competitive and aggressive, especially in areas where tillage has been used. These weeds use vital soil moisture, nutrients, and often out compete slower growing perennials for sun light. Early control of these weedy pests is crucial for stand establishment as they produce copious amounts of seed, compounding the problem exponentially the next growing season. One should have an established plan to deal with weed competition before planting.

Fertility

Soil fertility is an important part of any planting. Without proper nutrients, plants cannot survive. There are sixteen chemical elements known to be essential for the growth of most plants; Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus, Potassium, Calcium, Manganese, Magnesium, Molybdenum, Sulfur, Iron, Boron, Zinc, Copper, and Chlorine (Hartman et al. 1988). A soil test is necessary to determine the nutrient levels on site. Soil pH dictates the availability of these nutrients, and is an important part of any soil test. The accompanying chart lists some of the most important plant nutrients, and their availability according to soil pH. Soil amendments such as lime, used to reduce soil acidity, may be necessary to adjust the pH so that these nutrients are readily available for plant use.



Complete fertilizers contain 3 primary nutrients; nitrogen, phosphorus, and potassium. The analysis of the fertilizer is

represented by 3 numbers on the bag or bag label. The first number represents amount of nitrogen. The second number represents amount of phosphorus, and the last number represents the amount of potassium. It is important to note that these numbers represent pounds of nutrient per 100 pounds of fertilizer. If a land manager applied 100 pounds of 13-13-13 fertilizer to a site, the actual application of nitrogen, phosphorus, and potassium would be 13 pounds each.

Figure 1. Root comparison between a perennial prairie grass on the left and annual wheat on the right.

When establishing perennial, warm season grasses, it is often best to defer fertilization until after the first growing season. Nitrogen fertilization favors the growth of annual grasses and broadleaf weeds over perennial native grasses (USDA, 2003). Perennial plants invest much of the first year's growth producing strong, deep root systems. As a result, annual weeds can produce more rapid top growth, and shade out the desired perennial. The addition of fertilizer during this early developmental stage contributes to stand reduction or loss via direct competition from annual weeds. The image on the left shows a comparison between two cool season grasses, intermediate wheatgrass, *Thinopyrum intermedium,* and annual wheat,*Triticum aestivum.* Note the difference in the amount of root material under the perennial on the left side of the picture and the annual on the right side of the picture.

Chemical Weed Control

Herbicides can be very effective tools for successful establishment of new conservation plantings. They may be liquids, aerosols, wettable powders, or granular, and require training and specialized equipment for their application. Information concerning their use, application rates, rain fastness, restrictions, tolerant crops, and weeds controlled may be found on the chemical label. It is imperative to follow all instruction on the label and read it thoroughly to prevent damage or injury to the crop, applicator, and environment. Application timing is critical, and best results are achieved when applied to young, actively growing weeds. If surfactant or crop oil is recommended, their use will greatly aid the chemical's effectiveness. Applying the recommended rate is critical as using too little will not provide adequate control, promotes resistance, and too much may damage or kill the crop of interest. Applications should be uniform with no gaps in coverage to be most effective. For more information contact the manufacturer or you local county extension service. Herbicides may be broken down into two main categories, pre and post-emergent.

Pre-Emergent Herbicides

As the name implies, pre-emergent herbicides have little to no effect on plants that have already germinated. As previously stated, it is important to read the label and follow all directions. Pre-emergent herbicides usually require some form of disturbance or cultivation to be worked into the soil for maximum control. This may include, but is not limited to, shallow tillage, rainfall, or irrigation. These

chemicals typically form a shallow band under the soil surface and inhibit germination or kill seedlings as they germinate. They are generally non-selective, so it is important the desired crop stand be achieved before their application.

Timely application is critical for maximum control. It is important to note the chemical's length of activity, and make re-applications as needed. The applicator must also consider the proper form of chemical to use. Crop residues may inhibit liquid applications from reaching the soil surface and binding with soil particles. Granular chemicals may be the best option in this scenario as they can work their way through the residue and make contact with the soil surface. Controlling grassy weeds in a grass planting or broadleaf weeds in a forb or legume planting can be difficult, and pre-emergent chemicals are often the best method of control.

Post-Emergent Herbicides

Post-emergent herbicides kill weeds that have emerged and are actively growing. Weeds are most easily controlled and require less chemical if the application is made while they are young, preferably the 2-6 leaf stage. Applications made to mature plants or during times of stress such as heat or drought can hinder the chemicals effectiveness. There are two categories of post-emergent herbicides, Selective and Non-Selective.

Figure 2. Weeds are best controlled with post emergent herbicides when applications are made to young, actively growing stands as represented by these Poor Joe, *Diodella teres*, seedlings in the 2nd leaf stage.

Non-Selective Post-Emergent Herbicides

These chemicals typically damage or kill any plants they come into contact with. One of the most common herbicides in this group is glyphosate. These chemicals are most useful for treating sites before planting or crop emergence. They can greatly reduce the amount of competition in new plantings from established weeds. It is a good practice to allow weeds to make an initial flush on newly broken ground and treat with a broad spectrum herbicide before planting. This may be done multiple times if heavy infestations are anticipated. They may also be used in site preparation to chemically "burn down" planting sites. Broad-spectrum, post-emergent herbicides also have some specialty applications that are useful. They may be used for spot applications in problem areas where some stand loss can be tolerated or is deemed acceptable to control highly invasive weeds. They may also be used in shielded sprayers to treat areas between rows in production fields. Herbicide wicks have been developed that mount to the front end loader of a tractor of bumper of an ATV. These are useful for treating weeds that are taller than the crop. They consist of a 4 to 6 inch diameter PVC pipe with small

Figure 3. ATV mounted herbicide wick applicator.

holes drilled along its length. Tightly woven canvas or similar material is then wrapped and glued to the PVC pipe. One end of the pipe should have a faucet or ball valve. This is useful for emptying the chemical from the pipe and controlling the chemical's rate of flow through the wick. The herbicide, usually a 50% water and glyphosate solution, should saturate the fabric without having any steady drips or dribbles. Some dripping is acceptable. The applicator then drives slowly through the field, allowing the wick to brush against taller weeds. The rate of flow or ground speed should be such that the wick never becomes dry. Plants should show a wet, oily appearance after the wick has brushed them. This is very useful on tall weeds, and the high concentration of chemical tends to be more effective on mature weeds than spray application rates. They are easily fabricated with materials found at local hardware stores, and when mounted to a hydraulic front end loader, the applicator can adjust the height on the fly while making the application.

Selective Post-Emergent Herbicides

Selective, post-emergent herbicides generally control monocots (grasses) in dicot (broadleaf) plantings or vice versa. The crop is tolerant the chemical and the weeds are not, thus selectively controlling them. There are many grass selective herbicides on the market, and they are very useful tools; especially for controlling aggressive, warm season, annual grasses in forb or legume plantings. Again, timely application is important. Best control is obtained when applied to very young weeds.

Figure 4. ATV mounted herbicide sprayer

Mechanical Control

Not all locations lend themselves to the use of chemicals for weed control due to proximity of sensitive areas, restrictions, or due to the lack of equipment or trained personnel. Timely mowing and burning are two mechanical management tools that allow the land owner or manager some options for controlling weeds.

Mowing

Mowing is one tool that most people should have access to. The goal of an annual plant is to germinate, grow, and produce seed for the next generation in a single growing season. It is important to know the weed's life, and use mowing to break or stress this cycle. Mowing decreases competition for sunlight by removing the top growth from faster growing weeds. Perennial wildflower species that overwinter as a rosette of basal leaves close to the ground and late flowering native grasses can be mowed in the early spring, before elongation (USDA, 1995). This is particularly important because it does not damage the crowns of the crop, and specifically targets the faster growing annuals; causing them stress. Mowing should be used to control weed height and to inhibit weeds from making a viable seed. Allow the weed to flower, and start allocating its resources to seed production. Then mow the tops from these plants before the seed is set or viably mature. This stresses the plant for resources and time, limiting the

amount of re-growth and seed production. It is important to note that mowing too early may force some weeds into a more prostrate growth form, making them harder to control. Mowing can also be coupled to times of stress such as drought when there is little moisture for rapid re-growth or seed fill. Annual plants typically have shallower root systems and will be affected by environmental factors such as drought to a greater degree than deeper rooted perennial plants. If possible, always adjust the height of the mower so that it cuts the maximum amount of weed material and the minimal amount of crop. This may be done with hydraulics on a tractor when using a bush hog or similar rotary mower. It is always a good idea to chain the mowing deck at the desired height as hydraulics sometimes leak and can creep down while in use.

Prescribed Fire

Figure 5. Rapid green up of native plant production fields after a spring burn.

Many of the native plants used in conservation plantings evolved in an environment with periodic wildfires. With the appropriate prescribed fire frequency, based on objectives, the native plant community can be maintained as a forest, woodland, savannah, shrub land, or grassland. The amount of time since a fire is the most important factor of a fire's impact on vegetation structure and composition. Time of year has minimal impact on the native plant community (Weir et al. Oklahoma Cooperative Extension Service). Native Americans capitalized on this aspect and adapted plant communities to fit their needs. Perennial species, once established, have enough reserves in their roots to re-sprout after fire events where as an annual typically does not. Periodic prescribed burning can be a powerful tool to maintain the desired structure and plant communities within a conservation planting. Prescribed burning removes residues, improves soil qualities, controls brush species, and eliminates weedy pests by selecting for a fire tolerant plant community. It requires the use of trained professionals, and must be conducted on specific weather conditions. Prescribed burn plans need to be established that meet the desired conservation goal, provide adequate protection to surrounding areas and personnel, and follows the laws.

Conclusion

There are many tools available to land managers to maintain conservation plantings. They may be used alone or together in management plans. It is important to inventory the available equipment and resources, and to have clearly defined goals. Choose the best management practices to achieve these goals. Proper set up and attention to detail in the beginning can limit the amount of future maintenance work. For example, planting Round Up® Ready Soybeans in advance of the conservation planting would improve soil quality, and limit weed pressure from the seed bank due to the use of glyphosate herbicide on the resistant soybeans. For more information on soil testing, herbicides, and burning, please contact your local county agent.

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