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Integrated Crop Management for Alfalfa

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Integrated crop management (ICM) is a management strategy where producers assess the series of familiar crop production steps necessary for producing a crop, evaluating alternative practices for practicality, cost/return considerations, and environmental consequence, in an effort to increase efficiency and profitability of their enterprises. Most producers who practice ICM have applied its principles to corn and soybean production. This discussion is directed toward the question -- How well can IPM be applied to hay production management?

As producers consider the alternative practices and management twists possible in hay production, they will each start with a different set of resources (money, soil, skills) and goals. So, it is not a great surprise that no two hay producers do things the same way. I will not be able to address all of the alternatives that hay producers face in managing hay production, but will list a few common areas where decisions become an important part of the end efficiency or profitability.

**Soil Evaluation and Nutrient Management**

Forage plant species are all generally adapted to productive, well drained soils. The concerns about species adaptation arise when soil conditions are less-than productive, or are poorly or excessively drained. Forages are frequently grown on ‘marginally productive’ soils, where cash grain or row crops are unprofitable. Under these conditions, forage grasses and legumes are often chosen on the basis of their tolerance to adverse soil conditions and their likelihood of producing profitable forage yields on otherwise un-profitable soil sites.

Forage grasses are generally more adaptable on sites with variable soil conditions. They are more adapted to both good and poorly drained soils than are legumes. Only a few grass species (reed canarygrass) can persist on very, poorly drained soils. Grasses with shallow root systems (Ky. Bluegrass, redtop, timothy) are not well suited to excessively drained soil sites. When soil moisture adequacy begins to decline, these shallow-rooted grasses often cease production in a drought-induced dormancy. Deeper rooted grasses (many of the native prairie grasses, smooth bromegrass, etc.) can exploit water deeper in the profile and remain productive for a longer time.

Forage legumes are more sensitive to poor soil drainage. The true clovers (red clover; white clover) and birdsfoot trefoil are more tolerant of imperfectly drained soils than are alfalfa, and
sweetclover. Alsike clover is the most tolerant of poorly drained soil sites. Root disease complexes, sometimes associated with imperfectly drained soils, are sometimes implicated in the short productive stand life of forage legumes on these sites.

The Iowa State University Extension bulletin 'Selecting Forage Species' (Pm-1792) provides several tables listing the various soil site adaptability traits of our most commonly grown forage legumes and grasses.

In addition to adaptability to droughty or wet soils, the forage grasses and legumes can be categorized according to their tolerance of soil acidity. Again, grasses, true clovers and birdsfoot trefoil are generally more tolerant of low pH (acid) soils than is alfalfa.

Soil acidity is a manageable and correctable soil condition and should be a part of an overall soil testing and fertilization program. Liming materials are used to change soil acidity, but the effect is not immediate. These liming materials, once applied and incorporated into the soil require time (6-12 months) to neutralize the acidity condition. The integration of cropping management for hay production must take this timeliness and 'lead time' need into account. The planning for a productive and profitable hay crop may, then, require a year or more planning horizon to facilitate the appropriate soil nutrient and pH correction ahead of the actual seeding operation.

Correction of needed phosphorous and potassium may also require a year or more 'lead time' if the need for correction is large. If the overall cropping management of previous cropping enterprises on that site have achieved and maintained an adequate soil fertility status for the establishment of the new hay stand, then correction or pre-seeding fertilization needs may be minimal.

Livestock manure is a good source of fertilizer nutrients for crop production, but for hay production, the best time to use manure in the rotation is during seedbed preparation, ahead of seeding. Once the hay stand is in place, particularly for alfalfa-based hay mixtures, manure application as top-dressing fertilization may add unneeded weed seed, field passes, compaction and plant crown injury.

Field Management and Plant Evaluation

Hay production is generally a multi-year enterprise, thus requiring regular plant, stand and production management assessments.

Establishment and seeding year management issues involve species and variety selection, seedbed preparation, the actual seeding operation, weed and insect management decisions, and several harvest events.

Species & Variety Selection— This selection process is site-specific and enterprise-specific. It not only involves the soil, fertility and site traits associated with adaptation, but also the persistence and end use goals, the nutritive quality potential of the crop and the nutritive requirements of livestock being fed or marketed to. Selection can also involve compatibility of components in a hay mixture, winter hardiness traits, disease resistances, potato leafhopper
tolerance, seed coatings, nutritive quality and even a several-days spread in maturity to facilitate harvest timing.

Seeding Management – There are many distinctly different combinations of practices and approaches to seeding hay fields. It is not difficult to come up with 30 or 40 uniquely different seed distribution, seed coverage, cover crop use and management, herbicide use option combinations. In practice, many of these combinations can produce a successful outcome. To do so, however, careful attention must be paid to details related to implement adjustment/calibration, seeding depth, seed-to-soil contact and the management of the competition from weeds and or companion crops. Slipping up on important steps can lead to excessive erosion loss from the site, thin, un-economical stands (which many producers choose to live with for the next 4 years!), or the worst case, seeding failure.

Seeding-year Management – Traditionally, when hay seedings were made with cereal grain companion crops there was as much (or more) priority placed on the production of companion crop grain and straw as for the establishment of the forage stand. Following this traditional system(s), at best one ‘stubble cutting’ of a mixture of cereal stubble, weeds and new forage was expected from the seeding year production. With the effective use of establishment herbicides, and minimal or no companion crop, it is quite feasible to harvest 2 to 3 cuts of high quality forage in the seeding year. To achieve this careful attention must be paid to the development of the newly seeded forage stand, the need for and timeliness of post emergence weed control and vigilance in monitoring insect presence and control.

Nutrient Management in Production Years – Hay crops remove large amounts of fertilizer nutrients over the course of the production years. Integrated crop management involves a regular monitoring of the fertility needs of the crop and the efficient, environmentally sound, and cost conscious use of fertilizer nutrients.

Harvest Management in Production Years – Three, 4 (and in some cases, even 5) harvests per year require a significant commitment to management attention. Hay is a perishable product. It changes rapidly in nutritive quality as it grows through each growth cycle of the season. It’s quality is at its greatest in the standing crop and the strategy through the remainder of the harvest, storage and feeding/marketing efforts is focused on minimizing losses and maintaining the nutritive or economic value of the harvested product.

Stand Evaluation – While the goal for a hay stand may be to harvest it forever as a perennial crop field, the reality is that stand density, annual yield and quality decline with stand age. Good managers are constantly assessing the productive potential of the field. When the field/enterprise is no longer profitable as a hay production enterprise, then the decision must be made when and how to terminate it. Too often tradition says that the field will be in hay for 4 or 5 years regardless of productivity or profitability. Winter kill, or weed or grass invasion may prematurely shorten the productive life of one of several hay fields. The best management decision for that field may be to terminate it after only 2 or 3 years whereas another field may continue to be profitable beyond its stand life expectations. Where grazing livestock are an alternate enterprise, a stand which has outlived its forage quality potential for on-farm hay or
cash market may be quite suitable as a productive pasture in another enterprise. You must remain flexible!

**Pest Management**

Too often when integrated crop management is mentioned the first and only thought is Integrated Pest Management (IPM)! IPM is only a component of ICM. When applied to hay production, pest management begins with disease or insect resistance in the variety(s) selected, includes seed fungicide decisions, and continues through the seeding and remaining production years with scouting and decisions related to weed, disease and insect management. The degree of control of hay crop pests is somewhat related the nutritive or market quality goals of the enterprise. The IPM concept of ‘economic threshold’ may have as much or more validity for economics-based pest management for hay crops because of the real economic impact on not only yield but on the feeding or market premium values associated with a quality hay product.

**Crop Enterprise Records**

The fourth stated component of ICM is the collection and interpretation of good financial records related to the enterprise. I suspect that of the crop enterprises on most farms, the manager/producer has a better ‘handle’ on the economics, profitability, or ‘break even’ costs and returns associated with the corn and soybean crops; few have the same sense of the total cost and return values for the hay crop. Unfortunately, many hay production costs are not counted and the ‘profitability’ of the enterprise is inflated. A difficulty also exists in placing a true economic value on hay used on-farm.

More producers are looking to hay as a new ‘cash market crop’. They quickly find that the production practices, bale type and forage nutritive quality that is applicable for an on-farm livestock enterprise is almost totally unsuitable and unsellable in the cash market place. Hay is a variable quality/value product. Its value varies with appearance, tested nutritive quality, and “type of package”. This latter “package type” factor becomes a very important factor in the hay’s transportability and potential to gain a market price premium. Producers in cash hay enterprises suddenly find themselves being “salesmen”, and find it much more difficult than selling a standard commodity in a well established grain market system.

Iowa State University has numerous Extension publications on topics relate to alfalfa and mixed hay production, pest management and hay testing. Extension publications from surrounding states and from hay-related agribusiness are also sources of additional information on the production and management of hay crops.