

KURA CLOVER: A Promising Pasture Legume for Wisconsin

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Kura clover (*Trifolium ambiguum* M. Bieb.) is a relatively new forage legume in North America that has potential to be a major component of Wisconsin's forage-livestock industries. Kura clover is native to southeastern Europe and western Asia and grows naturally in habitats ranging from poorly drained valley bottoms to mountain meadows at elevations greater than 10,000 feet. Although it apparently has not yet been domesticated in its native region, it is a highly regarded component of grazed natural grasslands. Although introduced into the USA in 1911, commercial development of kura clover was limited by ineffective nodulation, seed production difficulties, and poor seedling vigor.

Rhizobia capable of effectively nodulating kura clover have been identified and are now available through several commercial sources. Although seed production difficulties such as low and inconsistent seed yields and difficult threshing still are problems, a handful of seedsmen are now producing kura clover seed, and it is commercially available from several sources within the state. Seedling vigor is still a problem, but we now have guidelines that will allow us to maximize chances for successful establishment.

Although our experience with kura clover is still quite limited, we have gained over the last several years, some appreciation for the adaptation, management, and productivity of this new legume. Our knowledge about kura clover will expand and recommendations for management of this crop will be refined over the next several decades, but we will outline what we know about it now.

Adaptation

Kura clover is widely adapted to the temperate regions of the world and has performed especially well in the cooler temperate regions. It is known to survive very dry conditions and is more productive than white clover in the dry highland of New Zealand. In Wisconsin we have observed that kura clover tends to go dormant sooner than alfalfa or red clover in response to drought. So, although the plant persists through dry periods, productivity is depressed. We have had kura clover in production near Arlington, Wisconsin for eight years with no sign of stand decline, and stands are still strong after four years in the poorly drained soils near Marshfield. Excellent stands have also been established in pastures near Lancaster and Spooner. We conclude that kura clover is persistent and productive in all regions of the state and on most agriculturally useful soils of Wisconsin. Based on our observations and the literature, it seems that kura clover pH and soil fertility requirements are similar to red clover, i.e., it will do well under conditions that are less than optimal for alfalfa.

Characteristics

The characteristic that makes kura clover unique among the forage legumes adapted to Wisconsin is its massive rhizome (underground stem) system. The underground mass (rhizomes and roots) of a mature stand of kura clover has been reported to be as high as 9 tons per acre. Kura clover persistence is probably associated with the large rhizome system having large numbers of buds at various depths in the soil. When portions of plants are damaged by cattle, machinery, or freezing, new growth is initiated from buds on undamaged portions of the plant. We have found that individual kura clover plants can spread to a diameter of three feet over a three year period if it is not competing with other plants. In mixtures with grass, rhizome growth is less than half that.

Kura clover is a very leafy plant with stem production occurring primarily only in the first spring growth. During the rest of the season leaves are produced from short stems at or near the soil surface. Leaves are usually larger than red clover leaves and have no hairs. Because of the high proportion of leaves in kura clover forage, it is very high quality with protein concentrations ranging between 18 and 25% and neutral detergent fiber concentrations between 25 and 40% in Wisconsin conditions.

Management

Kura clover has the reputation of being difficult to establish. The above ground portion of kura clover seedlings are very slow to develop because much of the energy is used early for root development. Rapidly growing weeds or grass in existing pastures can be very competitive with developing kura clover seedling and cause stand failures. In research plots, we have successfully used clipping, grazing, and herbicides for control of weeds or pasture grasses. On an experimental basis, we have found that most herbicides compatible with red clover also work with kura clover; however, label laws must be followed carefully for commercial applications.

Optimum seeding rates for kura clover are probably slightly lower than for alfalfa. We have had excellent success with 8 lbs/acre of kura clover seed when sown with grasses. Other Wisconsin research has demonstrated quicker ground cover by kura clover and less weed pressure if rates of up to 18 lbs/acre are sown. We have had success sowing a small amount of birdsfoot trefoil with kura clover in order to increase forage yield in the first and second seasons. The birdsfoot trefoil will die out after a few years.

Kura clover requires a particular strain of rhizobia (different from red clover and alfalfa) for effective nodulation. If the seed is not already inoculated, your seed supplier should be able to provide the rhizobia and instructions on how to apply it. Seed should be planted as soon after inoculation as possible--preferably within hours. Mistakes in handling the inoculant or inoculated seed will surely result in stand failure because the clover will not fix nitrogen and not compete with weeds or other forage plants.

Kura clover can be grown alone or in mixtures with grass. We have successfully grown it in mixtures with Kentucky bluegrass, smooth brome grass, orchardgrass and tall fescue. Thus, the grass of choice should be the grass that a producer feels most comfortable with. Since the quality of kura clover is so high, it is not difficult to develop a grazing or hay harvesting system that results in neutral detergent fiber concentrations low enough for rations of dairy cows.

Productivity

The yield potential of a good stand of kura clover is about 80% that of a good stand of alfalfa, based on Wisconsin and Minnesota research. The lower yields are related to the large investment that the plant makes to below ground growth and energy storage, slow regrowth after

defoliation, and relatively early onset of dormancy in the autumn. These characteristics that tend to limit yield are also associated with increasing persistence.

Kura clover is affected little by grazing or harvest frequency of from three to five defoliations per season. Since regrowth originates from at or below the soil surface, defoliation to ground level is not detrimental to the plant and in fact will result in maximum yields. We have observed encroachment of perennial weeds, especially dandelions, in kura clover stands defoliated frequently and having to short stubble height.

Persistence

Kura clover is the most persistent forage legume commercially available for use in Wisconsin. The massive rhizome and root system represents a large underground Abud bank from which regrowth can originate after damage from wheel traffic, animal treading, freezing or other. We have not observed frost heaving in kura clover, and this is also probably associated with the extensive rhizome system. The rhizome is also a storage organ for carbohydrates that are used as a source of energy for regrowth and after defoliation.

No significant disease problems are known for kura clover; however, some insects that damage other legumes (such as potato leafhopper) also affect kura clover. We have had kura clover growing in mixtures with grasses and harvested five times per season to a 1.5 inch height for the last eight years with no sign of decline. Researchers in Minnesota have grazed kura clover for 12 years, and those pastures still have an excellent stand of kura clover. Observations from Wisconsin, Minnesota, and other parts of the world suggest that, once established, kura clover will be a permanent component of a pasture or hayfield.