

SUDANGRASS QUALITY AND YIELD TRAITS:

WHAT TO LOOK FOR

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ABSTRACT

Sudangrass has long been a common part of the crop rotation in desert Southwest agriculture. Sudangrass hay fits nicely into a winter vegetable or winter wheat crop rotation. In 2007, 71,323 acres of sudangrass were planted in Imperial County making sudangrass hay the ninth most important crop of Imperial County's \$1.3 billion agriculture industry. Sudangrass thrives during the high temperatures of the desert summer with few insect pests and diseases. Sudangrass hay is primarily grown as an export crop for the Far East. In the US most hay crops are sold on the basis of their chemical attributes; in the Far East hay grading and marketing is much more subjective. Subjective determinations of color, stem thickness, leafiness, and softness are the primary determinants of hay quality in the Far East. As in any "beauty contest", this system of hay grading may result in discrepancies between hay producers and end users. However, knowing the determinants of hay quality in the Far East should provide indicators of how to produce sudangrass hay for the export market in the desert Southwest.

Key Words: sudangrass, hay quality, export hay, desert agriculture

INTRODUCTION

In 2006, 68,289 acres of sudangrass were grown in Imperial County; 71,323 acres in 2007 (Agric. Comm. Rep. 2007). Sudangrass has long been one of the few annual crops that fit into the desert summer cropping rotation. Sudangrass has few insect pests and few diseases that affect crop yields. Sudangrass, a C₄ grass, thrives in the desert summer, where maximum daily temperatures often exceed 110° F. While sudangrass hay often is used in local feedlot diets, sudangrass is cultivated primarily as an export crop; Far Eastern dairies and beef herds being the principal end users.

In the US and in California, hay quality grades are determined primarily by objective chemical analyses; crude protein, acid detergent fiber, neutral detergent fiber, TDN, and mineral analyses. Ruminant nutritionists have determined that there are relationships between the chemical composition of hay and subsequent animal production. The value of hay is then dependent on its chemical composition.

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In the Far East; Japan, Korea, and Taiwan; however, hay quality grades are not determined by chemical analyses but rather on subjective attributes. An old saying is rather pertinent; beauty is in the eye of the beholder. In the Far East, hay quality is in the eye of the beholder; not determined by objective and unbiased chemical analyses. However another economic adage is also true; the customer is always right! If US hay growers are to sell hay to the Far East, then the attributes of hay quality of the ultimate customer should be known and local production practices altered to accommodate the customer.

This manuscript will discuss some of the recommended cultural practices for sudangrass hay production in the desert Southwest and enumerate the hay quality attributes desired by Far Eastern hay buyers.

RECOMMENDED PRACTICES

Soil preparation. A uniform even seed bed is necessary to obtain a good germination. High or low spots in the field will cause problems with subsequent irrigations.

Planting dates. Soil temperatures should be greater than 60° F for a good germination. In the desert Southwest sudangrass may be planted from March to June. Some growers plant in February, but germination and early crop development is delayed. Other growers plant sudangrass in late June or July following wheat, but elevated desert temperatures reduce germination.

Seed rates. Since the Far Eastern market demands a fined stemmed hay, high seed rates are planted; from 120 to 150 pounds per acre. Excessive amounts of seed while producing a fine stem, also may decrease the leaf:stem ratio of the hay.

Varieties. “Piper” is the variety most used in the desert Southwest for export hay.

Fertilization. Since color is such an important attribute in sudangrass hay grades, large amounts of nitrogen, while improving yields, may decrease the market value of the crop. If the prior crop has left behind no residual N, 80 to 100 pounds of N per acre preplant may be necessary for crop establishment. About 50 pounds of N per acre after each cutting, in two split water-run applications may be applied. Over the years, in the desert Southwest, N applications have decreased, to the detriment of yield, in order to harvest a light, preferred by the export market, colored hay.

Irrigation. Depending on planting date and the number of harvests, sudangrass may use from 4 to 5.5 ac-ft of water. On clay loam soils, an additional irrigation 5 to 7 days after the initial irrigation may be necessary to prevent crusting. Prior to the first harvest, 4 to 5 irrigations may be necessary. Subsequent harvests may require 3 to 4 irrigations. Excessive amounts of tailwater may scald sudangrass.

Harvest. Sudangrass may be harvested when the crop has 10 to 20% flower. Far Eastern hay importers often complain about excessive nitrate levels in sudangrass hay. Nitrates accumulate in the lower portion of the stem. To reduce nitrate levels in hay, the sudangrass crop should be swathed at 6 to 8 inches height. Also to reduce nitrate levels, fields should be swathed after noon or early evening so the plant may metabolize the stem nitrates to protein.

Disease. Brownleaf or bacterial leaf blotch is caused by *Pantoea ananas* and *Pantoea stewartii*. The desert flea beetle helps spread this disease during the hot months of July and August in the desert Southwest. Brownleaf affected hay is discounted in the Far East. Currently, there is no economic control of Brownleaf in sudangrass.

Pasture. In November and December, feeder lambs often graze sudangrass fields in the desert Southwest. Fields to be grazed should not be fertilized. Livestock should not graze sudangrass until the crop is 3 ft tall to avoid possible prussic acid poisoning. Frosted sudangrass **must not** be grazed as prussic acid poisoning is a definite risk.

Source: Meister, 2004.

BENEFITS

For the 2007 growing season, sudangrass ranked ninth, grossing more than \$49,000,000, among Imperial County's gross crop value, greater than \$1.3 billion; (Ag. Comm. Rpt., 2007). Imperial County has a 365 day growing season. Sudangrass fits nicely into a winter vegetable or winter wheat crop rotation. Many growers also plant sudangrass to occupy valuable field personnel during the relatively slow desert summer and to prevent valuable workers from migrating to other work. Sudangrass is not affected by torrid desert summer temperatures. Sudangrass, if irrigated, thrives in the desert heat.

On the other hand, sudangrass culture requires annual ground preparation and seed costs. On many occasions, second and subsequent harvests decrease in value for the export market. In the Far East, US sudangrass competes with Australian forage crops. High priced US forage crops, and abundant cheaper priced Australian forage crops may cause sudden, drastic reductions in the Far Eastern demand for US produced forage products.

Sudangrass grows when evapotranspiration rates are highest, during summer. For desert agriculture, if the amount of Colorado River water for irrigation purposes is decreased, sudangrass cultivation might very well be one of the first crop victims.

EXPORT HAY QUALITY – a moving target

In the US, hay marketing is largely defined by the chemical attributes of the hay. The chemical attributes of the hay; eg. the crude protein, the neutral detergent fiber, the acid detergent fiber, and the TDN affect animal production, milk yield and weight gain. In the Far East, these chemical attributes are not part of the sudangrass hay grading system. To further complicate Far

Eastern hay grading, each trading company has its own grading system. Also within one trading company, there may be regional differences within the same country regarding hay quality attributes.

The number of animals at an individual farm in the Far East is small; 20 being considered a large number. Less than 25% of the producers chop forage and mix the chopped hay into a “total mixed ration.” If the great majority of animals are then fed long-stemmed hay, it is quite understandable that livestock will select leaf over stem; farmers daily having to discard uneaten stems from the manger. High nitrates in hay cause cattle to get sick. In the Far East, dark green colored hay is associated with high nitrate content. Some hay trading companies do test sudangrass hay for nitrate content; hay having greater than 1000 ppm being rejected.

There are however a few common basic attributes of sudangrass hay quality in the Far East. **Color** is an important hay quality attribute. Hay importers may have between 4 and 10 different hay color grades ranging from “light” to “dark green.” Hay brokers are able to distinguish naturally light colored hay from hay that has purposefully been bleached during hay dry-down. **Stem size** is an important hay quality attribute. Hay importers may have about 5 to 6 different stem size grades; 2-4 mm fine stem, 5-7 mm medium size stem, >8 mm as thick stemmed hay, plus additional grades regarding the relative amounts of thick stemmed hay. Some of the importers also have several grades of hay **leafiness**. Soft stemmed hay is preferred. Using only stem size and color, it is possible for 20 (4 x 5) sudangrass hay grades to exist! A leafy, thin stemmed, light colored; soft hay is the ideal hay. Soft hay however is associated with some degree of hay moisture. Sudangrass hay bales are compressed before being exported. If the bales contain too much moisture, heating and hard “bricks” may form inside the compressed bale. If the bales are too dry, the bales may shatter when compressed. As is very apparent, export sudangrass hay marketing and grading is very subjective. Some of the regional hay buyers in the Far East, additionally, taste and smell the hay to further complicate hay grading subjectivity. US hay buyers learn this subjective hay grading system and then often spend countless hours haggling with Far Eastern brokers over differing concepts of hay quality. As with any “beauty contest”, there are often discrepancies regarding the highest quality sudangrass hay. If sudangrass export hay grades are so very subjective, it is then quite normal for the US hay producer to expect that same subjectivity and variability from US hay brokers when local roadside sudangrass hay is priced. Despite the great degree of subjectivity in Far Eastern hay grading, for hay producers in the desert Southwest, sudangrass hay fits nicely into the local cropping pattern.

REFERENCES

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