Observations of Commercial Tef Production in Nevada During 2006
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Introduction

Tef (Eragrostis tef) is a warm season annual grass native to Ethiopia. It grows as fine-stemmed clumps with many tillers. The clumps vary in height from 10 to 50 inches, depending on the variety. The numerous leaves are narrow, hairless, smooth and grow nearly as tall as the seed heads. The root system is fibrous and shallow, but massive. The seeds are tiny (1.25 million/pound) and grow in various shades of white, red, brown or almost black, again depending on the variety. They are produced in heads that range from very open to compact. Figure 1 is a line drawing of a typical tef plant.

Nevada Cooperative Extension fact sheet FS-04-51 discusses tef uses, adaptations and recommended agronomic practices in detail. It also provides information on the results of the 2003 tef demonstration trial efforts. Fact sheet FS-05-28 describes the results of the 2004 trial, while FS-06-58 presents the results of the work completed in 2005.

Commercial Plantings 2006

Following three years of increasingly larger and successful tef production six agricultural producers in Churchill County, two in Pershing County and one in Humboldt County planted tef in 2006. Data about cultural practices and production was acquired from all the producers in Churchill County and one in Pershing County. Data were unavailable from the second producer in Pershing County and the producer in Humboldt County indicated that tef production was unsuccessful on his farm. Unlike previous years, tef was grown for both grain and forage (horse hay) crops in 2006. Grain was produced on approximately 100 acres and forage was produced on approximately 200 acres. The tef used for seed production in 2005 was the variety “Dessie” while that used for forage was “Dessie” and a new variety named “Tiffany.” Both varieties of seed were obtained from dealers in southern Idaho.

Figure 1. Typical tef plant showing leaf shape and seed head.
Cultural Practices Used in 2006

The information concerning cultural and production practices was gathered using a mailed survey and interviews of participating producers. The information gathered was combined to prevent identification of the individual producers who agreed to participate in this project.

Planting dates and methods varied by producer and location. Seeding ranged from May 15 to June 13, 2006. The fields planted for grain production were seeded at approximately 2.5 pounds per acre while the fields used for forage production were seeded at twice the rate used for grain production.

Three types of seeding equipment were utilized in 2006: an air seeder; broadcast spreader; and conventional grain drill. In all cases, the seeding operation was followed by a cultipacker (ring roller) operation.

Some of the grain and forage production fields were fertilized with various amounts of nitrogen in the production year. The fertilizer applied included solid and liquid types. However, production levels related to the amount and type of fertilizer applied are not reported due to a lack of information on soil quality and unreliable information on actual application rates.

The amount of irrigation water applied was recorded and averaged for the season in an attempt to quantify mean water use for this crop. Irrigation water averaged approximately 3.2 acre feet/acre and ranged from 2.7 to 3.7 acre feet/acre.

Grain Production

The harvest procedure for each grain crop included swathing with a conventional sickle bar swather with the conditioner rollers removed or opened to the maximum width. Harvested swaths were allowed to dry for at least five to seven days and then combined using a “Gleaner” combine. The earliest harvest started on August 30, 2006, 107 days post planting. The last harvest in 2006 started on September 29, 121 days after it was seeded. The remaining fields were harvested approximately 114 days after they were seeded.

The seed was unloaded from the combine directly into 35" X 35" X 60" duffle top, woven polypropylene bags and then trucked to Caldwell, Idaho where it was cleaned.

Each bag held approximately 2,000 pounds of seed. The average clean seed percentage was approximately 80% and the seed was judged of sufficient quality to grind into flour.

The straw remaining after the combining procedure was bailed shortly following the combining operation and sold as low-quality hay.

Forage Harvest

The tef forage was harvested twice in 2006 with conventional harvest equipment and techniques. A representative sample to determine forage quality was obtained from one location consisting of adjacent fields of the varieties “Dessie” and “Tiffany” immediately after the first cutting was bailed. The samples were obtained from 20 bales from each variety before they were removed from the fields. All samples were obtained using a Penn State sampler and sent to a certified laboratory for quality analysis. A producer growing tef in a different location provided a third sample. It was from second cut, bailed and stacked hay. It was analyzed by the same lab as the first two samples.

The average time from seeding to first cutting was 52 days. The second cutting occurred, on average, 54 days following the first harvest.

Results 2006

Grain Harvest

The amount of grain harvested in 2006 was extremely variable. The largest yield was
approximately 1,500 pounds of clean seed per acre. The lowest yield was a complete failure due to excessive irrigation water being applied on one field. The average yield (excluding the failed field) was approximately 1,100 pounds of clean seed per acre. The seed was sold in Idaho for $0.35 per pound. The yield differences were thought to be related to soil quality and harvest activities. Like most crops tef production levels have proven to be directly related to soil quality. The use of swathing equipment that minimize disturbance to the seed heads results in higher yields due to less seed loss during the swathing process.

One field was harvested for forage approximately 60 days after planting and then harvested for seed in September. The forage yield from this field averaged approximately 2.5 tons/acre while the seed yield was less than 300 pounds per acre.

As in past years, the primary problem with seed harvest was excessive lodging of the plants before harvest. The plants fall flat on the ground due to heavy grain production in the seed heads and the fine stems produced by the plants. The lodging makes it impossible to harvest tef directly with a combine as the fallen plants are difficult for the swather to cut cleanly.

The straw produced during seed harvest is valuable for livestock feed. It averaged approximately 3 tons/acre and was used to feed dry cows or sold for approximately $60 per ton.

**Forage Production**
The forage yields ranged from approximately 4.25 to 5 tons per acre at 8% moisture.

First cut tef forage harvested at the ground level was severely damaged and re-growth was extremely slow. Some tef plants were killed under windrows after approximately one week. Cutting at higher stubble heights (3-4”) and with wider windrows resulted in rapid drying and earlier removal of the tef hay. This practice resulted in less damage to the tef plants and higher yields with the second cut.

We noted a relatively large quality difference between the two varieties that were tested after the first cutting and a second cut field of “Dessie.” Table 1 displays the quality data from each variety.

<table>
<thead>
<tr>
<th>Tef Variety</th>
<th>DM %</th>
<th>CP %</th>
<th>ADF %</th>
<th>TDN %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dessie</td>
<td>100</td>
<td>15.19</td>
<td>26.09</td>
<td>55.59</td>
</tr>
<tr>
<td>Tiffany</td>
<td>100</td>
<td>10.06</td>
<td>28.50</td>
<td>55.29</td>
</tr>
<tr>
<td>Dessie (2nd cut)</td>
<td>100</td>
<td>7.94</td>
<td>40.81</td>
<td>56.91</td>
</tr>
</tbody>
</table>

Much of the tef forage was sold as high-quality horse hay and averaged approximately $140 per ton. Some was fed by the producer to a mixed herd of beef cattle during the winter of 2006 with satisfactory results.

**General Observations Concerning Tef Production 2003-2006**

1) Tef grain production with the variety “Dessie” requires approximately 110 days from seeding to harvest.
2) Tef should be planted into a weed-free, firm and fine seedbed immediately following the last frost date in the spring.
3) Tef should be planted at approximately 2-2.5 pounds/acre for grain production and 4-5 pounds/acre for forage production. Heavier seeding rates are unnecessary.
4) Tef seed should be broadcast and rolled with a cultipacker following seeding.
5) Tef requires frequent, light irrigations the first 2-3 weeks until the grass
begins to produce several new shoots from the roots.

6) Over-irrigation will result in excessive competition from weedy summer annual grasses.

7) Best results are obtained when tef is cut and windrowed by a machine without conditioners.

8) Bailing the straw immediately following the combine operation improves the appearance and salability of the hay.

9) Tef produced for forage should be cut at the early boot, growth stage (approximately 55-60 days after seeding).

10) Tef produced for forage should be cut with a minimum 3” stubble height. The windrows should be dried as fast as possible, bailed and removed from the field.

Resources used to prepare this fact sheet


