CUTTING IRRIGATED HAY COSTS BY USING SOYBEANS

Steve Norberg, Earl Creech, Don Llewellyn, Steve Fransen and Shannon Neibergs[1]

ABSTRACT

Markets and price are factors difficult to impact as a producer, but farmers can have more impact on expenses. but finding ways to cut expenses requires creativity. In Washington State, producers spend about $310 per acre for cutting, raking and baling alfalfa. Part of this expense is moving from field to field and the labor that is required all summer long. Using soybeans for hay has the potential to be a one cut legume hay that has the potential to cut expenses significantly. To accomplish this you must be able to harvest good quality hay that produces enough tons per acre to make it successful. Research was conducted at Othello, WA and Logan, UT has shown that soybean hay yield averaged over these two irrigated locations 5, 5.8 and 6.5 tons per acre when harvested on September 1st, 15th, and 30th, respectively. Soybean maturity group seeded needs to be high enough that large seeds are not produced to reduce molding problems. Maturity group 4 or later in WA state and maturity group 5 in Logan, UT will reduce seed development by September which will eliminate these problems. Producers in WA State have grown soybeans successfully. Soybeans appear to dry quicker than sudan grass hay. Soybean hay typically has 16 to 22 percent protein and producers have raised as high as RFV of 174. However, like all hay it can produce much lower RFV as well. Current research being conducted is looking at plant morphology's effect on yield and quality of soybean hay.

Key words: Alternative hay crops, soybean, hay yield, hay quality

INTRODUCTION

Farmers in Washington State harvest alfalfa on average four times a year costing about $310 per acre for swathing, raking and baling. Ideas to reduce costs by limiting the number of cuttings is one approach. Low lignin alfalfa is a GMO trait with hopes of reducing one cutting per year while maintaining quality. Nice idea, but what if you could eliminate three cuttings per year? More difficult? Likely, so perhaps finding an alternative legume crop makes sense. This is what created my interest to rediscover soybean hay.

Soybeans were first widely used in the United States as a hay crop in the 1870's. By the 1900's, USDA was encouraging production of soybeans as hay. Some early research showed soybean hay could match or exceed alfalfa hay for milk production in eastern U.S. Over time, soybean hay production has become almost non-existent as its popularity as an oil seed crop had increased. A lot of research has been conducted on soybeans and an infrastructure is well established, so it provides a lot for us to work with in redeveloping a soybean hay industry.

---

[1] S. Norberg (s.norberg@wsu.edu) Regional Forage Specialist, Washington State University, Pasco, WA, 99301; E. Creech (earl.creech@usu.edu), Forage Agronomist, Utah State University, Logan, UT 84322; D. Llewellyn (don.llewellyn@wsu.edu), Regional Livestock Specialist, Washington State University, Kennewick, WA 99336; S. Fransen (fransen@wsu.edu), Forage Specialist, Washington State University, Prosser, WA; S. Niebergs (sneibergs@wsu.edu), Associate Professor, Washington State University, Pullman, WA 99164. **In:** Proceedings, 2015 Western States Alfalfa and Forage Symposium, Reno, NV, 2-4 December, 2015. UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA 95616. (See http://alfalfa.ucdavis.edu for this and other alfalfa conference Proceedings.)

Much of the information on the web concerning soybeans hay stems from a soybean grain crop gone bad from drought and producers are trying to salvage something, which does not provide a good picture of what can be accomplished. Growing soybeans for hay is different than growing for grain. Even the number of herbicides and insecticides you can use is different. However, using Roundup Ready™ soybean varieties makes the herbicide decision easy unless you have glyphosate resistant weeds. Whatever herbicide you use, make sure it is labeled for soybean hay production.

The first and probably the biggest decision in developing a successful soybean hay crop is selecting a variety to plant. For haymaking, select varieties without large seeds as they will mold in hay. Since all soybeans will produce seeds, harvesting at an early growth stage can help to minimize the problem. Research has shown that soybeans have their highest relative feed value (RFV) at flowering (R1), then RFV decreases with maturity. Palatability also declines as soybean matures and stems become higher in lignin and fiber. For silage or green chop, a shorter season variety would do just fine as the stems would be ground up and seed would not mold. For areas like Washington, a maturity group 5 to 7, soybean will never make seed and will give a higher forage yield at the R1 or full flowering (R2) growth stage than earlier maturity groups and provide a large window in September for harvest. For comparison, soybean grain production in Washington would usually require a maturity group 1 soybean. Areas farther south would need to select the latest maturity group bean that you can buy and harvest for hay before seed mold becomes a problem. A maturity group 7 soybean will achieves pod stage (R3) in Logan, UT by the end of September, with little seed development.

Soybean seed inoculation with proper inoculant *Rhizobia japonicum* prior to planting is a must if the field has not grown soybeans in the last three years. If you grow soybeans without inoculating expect protein levels to be half and a poor yield. In the Pacific Northwest we have experienced problems with seed corn maggot attacking the seedling prior to and at emergence which has eliminated or reduced stands. We recommend a seed treatment with of the full labeled rate of Cruzier Max™ to help protect seedling during emergence.

PRODUCER EXPERIENCES

In 2014, Jeb Whitby grew his first soybeans for hay in the Columbia Basin near Basin City, WA in two small irrigated fields about 10 acres each (Figure 1). Jeb planted his Roundup Ready™ Gamekeeper from Eagle Seeds under a pivot in early May and harvested on August 28 (Figure 2) and baled it seven days later on September 4 (Figure 3.) It yielded 4.7 tons/acre. Even though Jeb put Cruizer Max on his soybeans, his stand was reduced from 140,000 seeds per acre to about 70,000 plants per acre by the seed corn maggot. He had to stay on top of his weed control as weeds wanted to come into the stand but he was successful. Jeb was amazed at how little water the soybeans took, how well it filled in, and how fast the hay dried after cutting. Jeb said the soybeans dried much faster than sudangrass because the conditioner could crush the stem, where it could not on the sudangrass due to the nodes being too tough. After two day of windrow drying, Jeb spread the soybeans with a tedder, which covered the entire ground, and put it back into windrows two days before baling. A second field harvested on September 11th was baled 22nd which yielded similar to his first field. Currently, Jeb thinks soybeans fit best on his farm in a rotation after fall planted triticale and before alfalfa.

Another farmer in Washington, Craig George, has grown soybeans for hay for two years near Ellensburg, WA at an elevation of 1,600 ft. Craig is looking at soybeans as rotational crop to go with his timothy hay to help control grassy weeds and break disease cycles in between timothy hay crops. Craig grew Large Ladd from Eagle Seeds and harvested 2.75 tons/acre this year on August 27th, 2014 (Figure 4). Craig's soybean hay in 2013 had a relative feed value of 174 (Figure 5). Last year Craig fed soybean hay to horses, goats, lambs and cattle and he says they all like it. What amazed me was that Craig told me his horses preferred soybean hay to his alfalfa hay.

WSU AND USU RESEARCH

In general, feed soybean hay just as you would alfalfa hay, as it may cause bloat as it is high in protein. Use relative feed value, NDF and ADF to determine how good the hay is. Research has shown that RFV typically ranges from 120 to 175. Cooperating WSU and USU Extension specialists and staff at the NIRS Consortium, are working on developing NIRS equations for soybean hay quality and determine advantages and disadvantages of different maturity groups planted in Washington and Utah. Yield data from these experiments ranged from 4 to 10.5 tons/acre. Selecting too early of maturity group can limit yield (Figure 6.). Averaged over locations, delaying harvest from the 1st to 15th of September increased yield 0.8 ton/acre for maturity groups 4 and 7 and another 0.87 ton/acre waiting from September 15 to September 30th. Maturity group 4 at the end of September will have seed that fills the pod at Logan, UT and would slow down drying and may cause mold. Figure 7 shows 8 tons/acre soybean hay in research plots at Othello, WA in 2013. Yields at Othello ranged from 3.6 to 6.0 tons/acre in 2012 and 7.5 to 10.8 tons/acre in 2013. Yields at Logan Utah ranged from 3.0 to 6.3 tons/acre in 2012 and 2.7 to 5.6 tons/acre in 2013. Data from these experiments show that late maturing varieties continue to increase yield throughout September. Soybeans become more profitable the farther you have to road your equipment due to decreased labor costs as well as decreased costs in 3 cuttings and 2 rakings which amount to a savings of $80/acre. Increasing soybean yield potential may allow this rediscovered hay crop to compete directly with alfalfa for profitability in the irrigated West due to saved irrigation water and decreased harvesting costs.

This material is in process of being put together to be submitted for a peer reviewed scientific journal article.

Figure 1. Jeb Whitby standing next to his soybean hay crop that yielded 4.7 tons/acre on August 28, 2014.

Figure 2. Swathing of Gamekeeper™ soybeans on Jed Whitby's farm on August 28, 2014.

Figure 3. Baling of soybean hay into 1,100 lb. large square bales on Whitby's farm September 4, 2014.

Figure 4. Craig George standing next to his 2.75 ton/acre soybean hay crop on August 27, 2014.

Figure 5. Craig George's soybean hay that had a relative feed value of 174 on August 27, 2013.

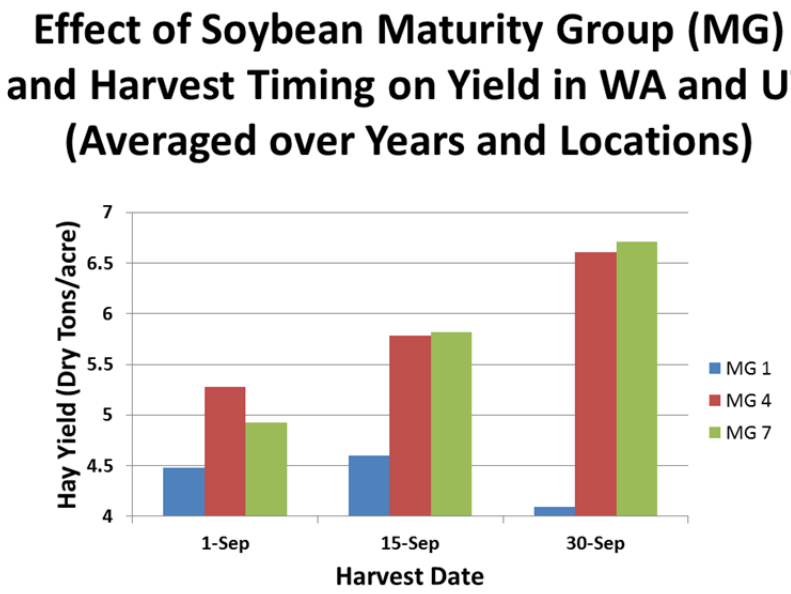

Figure 6. The influence of soybean variety (maturity group) and harvest timing on yield averaged over years (2012 and 2013) and locations (Logan, UT and Othello, WA).

Figure 7. Steve Norberg's Assistant Emanuel Farias standing next to research plots that yielded 8 tons/acre.