

converted to ethanol. Unfortunately, switchgrass does not grow well in most of Washington without irrigation. Tall wheatgrass on the other hand has been grown in dryland sites of Washington for over 50 years. It also occurs throughout the Great Plains, western states and Canadian Prairie provinces. This widely adapted grass produces as much as 7 tons of biomass per acre. It is far from an ideal pasture/hay grass, but its biofuel potential is intriguing.

Tall wheatgrass stems make up a large percentage of the total biomass. Stems are mainly composed of cellulose and lignin, and the leaves have less of these structural carbohydrates. Structural carbohydrates are not optimal for ethanol production so ethanol production from tall wheatgrass might not be economical. However, gasification and direct combustion of tall wheatgrass are definite possibilities.

Gasification of tall wheatgrass feedstock involves heating the biomass in order to convert the material into combustible syngas. The syngas can be cleanly burned to produce heat or generate electricity. This process is in operation in Scandinavia. Direct combustion involves burning bales, pellets, or finely chopped feedstock. Direct combustion might be an option for rural people looking to reduce their reliance on natural gas and/or electricity to heat farm buildings and homes.

The Pullman Plant Materials Center in cooperation with WSU established a study at the Prosser Irrigation Agriculture Research and Extension Center to compare 4 tall wheatgrass varieties. One of the varieties, Szarvasi I, is a Hungarian line specifically developed for the European biofuel market. The Prosser data indicate that Szarvasi I is no better than the pasture/hay varieties currently being grown in North America. Plant Materials Centers in several western states are installing similar studies to determine if there are regional differences in yield, energy output, and plant adaptation.

Biofuel Feedstock Research in Irrigated Central Washington

AN HANG¹, STEVE FRANSEN¹, AND HAL COLLINS²

1. DEPARTMENT OF CROP AND SOIL SCIENCES, IAREC-PROSSER, WSU
2. USDA-ARS VEGETABLE AND FORAGE RESEARCH UNIT, PROSSER, WA

The biofuel feedstock trials and the search for better crops in our cropping system have been in our program since 2004 under irrigation of central Washington. Most of the temperate and sub tropical crops have been included in our trials from oil producing crops camelina, canola/rapeseed, crambe, mustard, safflower, soybean and sunflower to biomass crops as switchgrass for cellulosic ethanol. Camelina, a short growing season oilseed, belongs to the same family with canola and mustard which can be produced on marginal land with low energy input and is a short growing season crops. Camelina oil is a source of high quality oil with over 30% Omega-3 fatty acid and second to flax oil. Canola both spring and winter species can be produced well in Washington. Winter canola requires 10 months to mature and its yield doubled spring grown canola. Mustard is another *Brassica* species which tolerates more harsh weather and low soil nutrient. Safflower produces well in Washington and uses less water than soybean and can produce high yield and high oil concentration. Safflower and winter canola can produce 1700 to 2500 lbs oil per acre. Soybean with maturity groups 000, 00, 0 can be grown in Washington and produced from 2950 to 3900 lbs per acre on sandy soil if enough irrigation is applied. Switchgrass is a perennial warm-season grass produces high biomass yield after the establishment year. Under irrigation we produce two harvestable biomass harvests per growing season. The first biomass harvest is taken in early July and the final in early October. Switchgrass is photoperiod sensitive with early maturing cultivars transitioning into winter dormancy earlier than later maturing cultivars. If allowed to transition into dormancy in the fall, we have not experienced winterkill problems in our environment and under our agronomic management practices.

Camelina Production in Irrigated Central Washington

AN HANG, DEPARTMENT OF CROP AND SOIL SCIENCES, IAREC-PROSSER, WSU

Camelina (*Camelina sativa* L.) is an ancient crop and is a native of northern Europe from Finland to Romania and east to Ural Mountains. Camelina is grown for its oil used as lamp oil, medicinal treatment and as an edible oil. It belongs to a large mustard family (Brassicaceae) like canola, rapeseed and vegetable mustard green and mustard seed. It is grown in marginal agriculture lands with low fertilizer and low soil moisture. Camelina is a short