HORSE HEAVEN HILLS DEMONSTRATION BUFFER PROGRESS REPORT 2006

The Horse Heaven Hills lie between the Columbia and Yakima rivers in southcentral Washington. Rain fall is some the lowest in the Pacific Northwest, and dryland wheat growers almost exclusively utilize a crop-fallow system. Wind erosion is a serious concern, and growers need more options to protect their soil resource. The USDA NRCS Pullman Plant Materials Center initiated a project in 2004 to evaluate and demonstrate a number of conservation plant species.

The Plants

Caragana is a drought tolerant shrub that originates from Asia. It is also known as Siberian Pea Shrub. It is a very popular dryland shelterbelt and can grow to 12 feet in the Horse Heaven Hills. Survival and growth are highly dependent on weed control and moisture. The canopy is quite dense and it does a very good job of wind reduction. The plants are very long lived but do not spread.

Rocky Mountain Juniper is an evergreen shrub with male and female plants. It is very widespread in the West but it is not native to the Horse Heaven Hills. Western juniper is the native juniper that occurs on the west end of the Horse Heaven Hills. 'Bridger Select' Rocky Mountain Juniper was developed by the Bridger, Montana Plant Materials Center.

It is very dense, pyramid shaped, and drought tolerant. It should achieve a height of 10 feet in 6-8 years.

Big Sage is a widely occurring, landscape dominating native shrub. Its 4 major subspecies (basin, Wyoming, mountain, spicate) range in height from 1 to 15 feet. Big sage typically grows to 4-6 feet in the Horse Heaven Hills. It is long-lived, very deep-rooted, and competes well with weeds. It is not fire tolerant.

Rubber Rabbitbrush is a native shrub usually 12 to 80 inches tall, but varying from dwarf forms to types over 10 feet tall. Rubber rabbitbrush is composed of numerous subspecies (>20) and shows considerable variation in size, stem, leaf, and flower characteristics. It vigorously invades disturbed sites such as burned areas, roadcuts, and overgrazed rangelands but gives way to other plants as the plant community matures. It is an excellent plant for controlling erosion because of its deep roots, heavy litter, and ability to establish on severe sites. Some populations of this species may have potential as a source of industrial chemicals (rubber, resin, etc.).

'Snake River Plains' Fourwing Saltbush is an upright native shrub from 1 to 6 feet tall depending on site conditions and genotype. 'Snake River Plains' Fourwing saltbush originates from SW Idaho and is quite cold tolerant. It has performed well in trials conducted at Lind, Central Ferry, and Saddle Mountain, Washington. It occurs as pistillate (female), staminate (male), or more rarely monoecious (female and male) bushes. It is best suited to deep, well-drained sandy soil but vigorous plants have been grown in heavy clays as well. It is primarily recommended for the 8-16 inch precipitation zones. Research indicates that it may resprout following fire.

'Trailar' Western Clematis is a native, fast growing, vigorous climbing, vine with both male and female plants. It typically occurs in areas that receive between 10-20 inches of effective precipitation. However, studies conducted by Pullman PMC show that it will grow in sites that receive as little as 7 inches of effective precipitation. It has abundant clusters of showy white flowers that show from July into August. Seed appears cotton-like in fall when mature. It is a good ground cover for erosion control, may be useful as a screen, and provides habitat for some wildlife species. It is a layering plant, which makes it useful for stabilizing steep roadcuts.

'Magnar' Basin Wildrye is a robust, large native bunchgrass. Best adapted to moderately saline or alkaline lowlands, flood plains, flow in areas with high water holding capacity. Especially suited to deep, fine textured clayey to loamy soils that receive 8-12 inches precipitation. Plantings have been established in rainfall areas as low as 5 inches, however basin wildrye plantings are not recommended in areas with less than 8 inches annual precipitation. Poor seedling vigor usually results in sparse stands, but it is one of the highest producing grasses once established.

'Volga' Mammoth Wildrye is a very coarse, drought tolerant, creeping grass. It requires at least 7 inches of precipitation. 'Volga' is the only released cultivar. It was selected for superior performance in stabilizing inland sand dunes and critical areas on

coarse textured soils. 'Volga' is well established on sands near the Vantage and Vernita bridges.

'Bozoisky' Russian Wildrye is a long-lived, very drought tolerant bunchgrass. Grows rapidly in the spring and produces abundant basal leaves that remain green and palatable through summer and fall as long as soil moisture is available. Once established, it competes effectively against undesirable plants and it withstands drought as effectively as crested wheatgrass. It can be difficult to establish because the seedlings lack vigor.

'Alkar' tall Wheatgrass is a long-lived, tall-statured, winter hardy introduced bunchgrass. Tall wheatgrass is commonly used for wind barriers to control soil erosion and drifting snow. It is also a preferred plant for bird habitat plantings. Tall wheatgrass performs well on upland soils that receive more then 12 inches of annual precipitation, and it is one of the most tolerant grasses of salt, alkali and high water table conditions.

Establishment:

Rooted plants of 8 of 10 species were transplanted into fallowed soil on April 7-8, 2004. Western clematis and fourwing saltbush plants were transplanted on May 18, 2004.

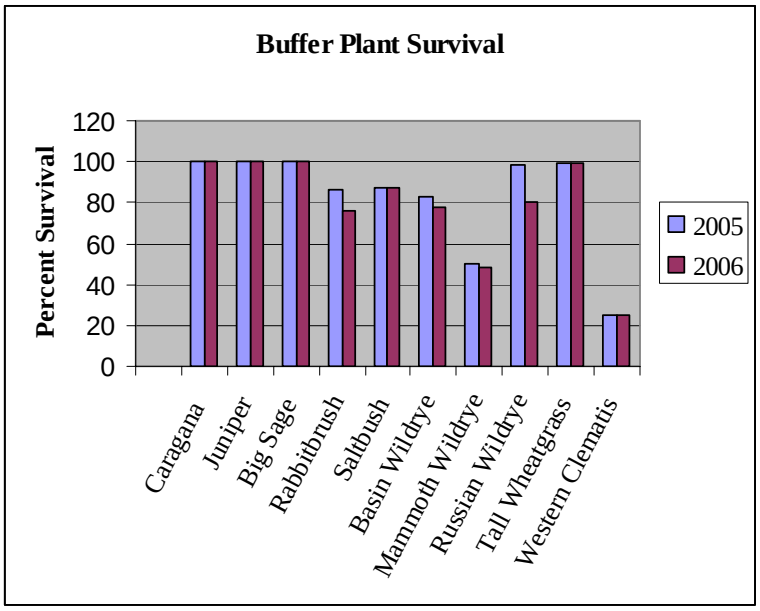
The entire planting was space planted to minimize competition. The shrubs were spaced 5-6 feet apart. Weed barrier cloth was laid in the shrub row to reduce weed growth and conserve moisture. The effective width of the barrier cloth was 10 feet (5 feet on each side of the row). The grasses were spaced 2 feet apart with a row and 3 feet between rows, and the western clematis was spaced 4 feet apart. The grass and clematis rows were maintained with clean tillage.

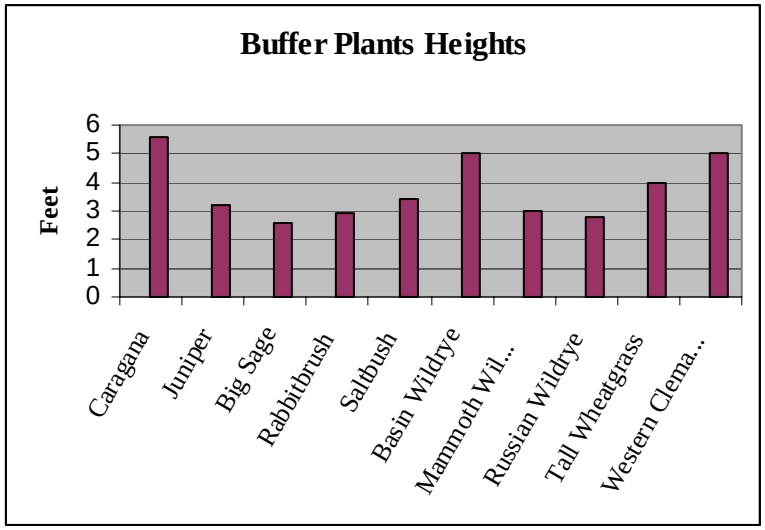
Each plant was watered the day of transplanting. Additional watering occurred on April 20th, May 5th, May 26th, June 18th, and August 4th, 2006. A 200 gallon tank of water in the bed of a pick up supplied each plant with approximately 1 liter of water at each watering.

Survival of all the plants was outstanding the year of establishment.

Rocky Mountain Juniper Seedling

Growth and Survival:





Caragana is one of the best performing plants in the planting. We pruned it back in the fall of 2004 to a height of 18-inches to stimulate stem numbers. Some of the plants are now 8-feet tall. Most of the plants were 2-4 feet wide and the canopy should close within a few years. While a closed canopy within the row will reduce wind, it will catch more Russian thistle carcasses and hand removal of the carcasses will be needed. The landowner reported that it tolerated 2,4-D herbicide drift quite well.

Rocky Mountain Juniper is performing very well. It is not as fast as growing as the caragana but it more trouble free. It did not require pruning and it catches far fewer Russian thistle carcasses.

Big Sage is one of the fastest growing shrubs in the planting and probably is reaching its maximum height. The plants vary considerably in size, shape, leaf density, and seed production. Some very tall native big sage plants occur a few miles west of the planting. These tall native plants should have better genetic potential for use as a buffer plant material.

Rubber Rabbitbrush is the most variable shrub in the planting. None of the plants are over 4 feet tall and a few are only 18 inches tall. Survival is not great and would be worse had barrier cloth not been laid to reduce weed competition.

Fourwing Saltbush should achieve a maximum height of 6 feet in the Horse Heaven Hills. This plant grows wider than tall and should reach a width of 10 feet. Survival and growth are excellent considering that the seedlings were not well developed at planting. A major concern about saltbush is its ability to catch Russian thistle carcasses. As many as 22 carcasses were pulled from a single saltbush plant in the spring of 2005!

'Magnar' Basin Wildrye is the tallest grass in the planting. Basin wildrye occurs naturally in moist draws in the Horse Heaven Hills and scattered plants can be found on upland CRP plantings. While it is tall, it lacks sufficient stem density to be a useful herbaceous wind barrier in the Horse Heaven Hills.

'Volga' Mammoth Wildrye is not performing well in this planting. Survival is poor, stem density is poor, and its height is inadequate. It is spreading via rhizomes so it has some potential for stilling blow-out areas along roadsides in the area.

'Bozoisky' Russian Wildrye is performing fairly well. It is too short and the stem density is only fair which make it marginally useful as an herbaceous wind barrier in the Horse Heaven Hills. It is very competitive and weeds are noticeably reduced around the plants.

'Alkar' Tall Wheatgrass is the best performing grass in this planting. It has excellent stem density and the stems are very robust. It competes very well with weeds in the row. Since this plant normally needs higher precipitation, clean tillage around the plants is needed to reduce competition during the first growing season.

'Trailar' Western Clematis is a slow growing on this site. Weed growth around the plants was heavy and difficult to control without injuring the plants. Layering (rooting at the stem nodes) is not occurring. This plant frequently climbs fences and other upright structures. Placing a short upright support at the base of each plant should enable this plant to climb and provide some wind barrier effect. Our research has shown this plant to be very persistent once established. The crown is below the soil surface and the plant tolerates fire well. This might prove useful for Russian thistle carcass management.

The shrub row was roto-tilled immediately prior to planting. Six-foot wide **Weed Barrier Cloth** was laid and the edges were buried to prevent wind throw. Shrub plants were planted along the east edge of the weed barrier. A layer of weed barrier cloth was then laid along the west edge of the shrub row. This effectively eliminated all weed competition in the row and retarded soil moisture evaporation. Some tearing of the weed barrier is occurring after three years but it is holding up well. Dust accumulating on the surface of the barrier is reducing UV damage to the barrier cloth.

Russian thistle and mustard carcasses are a major issue in this planting. The grasses were planted on the windward side of the shrubs, and we hoped that the grasses would catch the carcasses. This did not occur. Hand removal of carcasses in the shrub row has been needed each spring. **Cheatgrass** numbers have been generally low in the planting but they are very large and produce huge amounts of seed.

Where Do We Go From Here?

1. Expand the 'Alkar' Tall Wheatgrass planting
    a. Remove the other grasses this fall.
    b. Evaluate transplanting Alkar in November, February, and March (all w/o irrigation)
    c. Initiate a study to determine which herbicides can be legally and safely applied to the soil to control cheatgrass and Russian thistle.
2. Initiate a study at the Lind Dryland Experiment Station to evaluate new collections of Caragana made in central Asia.
3. Initiate dialog with other governmental agencies such as WA DNR, and develop a plan to expand testing of herbaceous wind barriers in the Horse Heaven Hills.
4. Continue to evaluate the shrubs.
5. Install upright supports at the base of each Western Clematis plant and evaluate wind reduction potential.