Shelterbelt Demonstration and Nursery

Cooperator: Donna Scory, Oyen

Shelterbelt Demonstration

CARA continues to maintain and monitor a Shelterbelt Demonstration site adjacent to the CARA Centre at Oyen. It was initially developed in the summer of 2004 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. Eight tree species, including Colorado Spruce, Green Ash, Manitoba Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffaloberry were planted in rows 100 metres long on May 28, 2004. Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees. Black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row out using an applicator pulled by a small tractor. Two discs, one on each side of the unit, cut a small trench in the soil when the machine moves forward. As the mulch unrolls, discs near the back of the unit throw soil over each edge of the plastic, securing it to the ground. A small hole is then cut where each seedling has been planted and the tree is gently pulled upright.

The drip tape irrigation system consists of a plastic tape which has outlets at regular intervals that allow a slow trickle of water to be delivered directly to the root systems of the seedlings. At the CARA Centre, the water source consists of two 1250 gallon water tanks on either side of the equipment storage shop. Rain water is collected from the roof of the shop and then piped to the trees. Rainfall was abundant in 2010 so the drip tape was only used in the fall when the water tanks were drained for the winter. In 2011, the trees were watered twice during the summer and once late in the fall.

The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing reasonable growth for our prairie climate. The plastic mulch has become weathered in places, particularly where it was not held firmly to the soil. Deer hooves have broken the plastic in several places. Damage from wildlife has also caused leaks in the drip tape. Adding wood chips as a mulch to the rows where the plastic mulch was not installed was considered in 2009, but the cost was prohibitive.

Oyen Tree Nursery

In the summer of 2006, the Shelterbelt Demonstration expanded by approximately 200 trees. It began in the spring when CARA took over the responsibility of caring for the Oyen Centennial Tree Nursery in partnership with the town of Oyen and Community in Bloom (Grow Oyen!). Twenty five trees and shrubs were re-located from a town site to a more convenient location behind the CARA building. Later in the spring, the Thundering Hooves 4-H Club donated 100 white spruce seedlings to the nursery. These trees will eventually be used as part of the tree replacement program for the Town of Oyen. In late June, the nursery expanded further when Oyen resident Darrow Tye arranged for the delivery of approximately 100 seedlings from Alberta Environment. Among this delivery were Ponderosa Pine, Lodgepole Pine and Red Pine. These seedlings were between 1 and 2 feet tall, and were planted into holes dug with a 3 point hitch post hole auger. Drip tape was not installed with this group of trees, but they have been watered by hand when necessary.

Fall vs Spring Planting Demonstration

The Shelterbelt Demonstration was expanded further in the fall of 2007 when a partnership was developed with PFRA to demonstrate the effect of fall versus spring planting of green ash seedlings. The seedlings were planted into strips covered with the plastic mulch. Holes for the seedlings had to be dug with the three point hitch post hole auger as the ground was very hard. Drip tape was not installed. An identical strip adjacent to the fall planting was planted in the spring of 2008. Soil conditions were much better, so planting was done by hand. Establishment and hardiness of the different plantings will be monitored. A count of the trees in the fall of 2008 showed the spring planting to have a much better survival rate. Fourteen out of 38 fall planted trees appeared either severely stressed or dead, while only 2 out of the spring planted trees did not survive. It is assumed the fall planted seedlings were stressed by the winter conditions, and perhaps the root development was inhibited by the hard soil at the time of planting. Roots may not have been able to penetrate out of the cylindrical hole left by the auger. The surviving green ash trees have progressed reasonably well, with few losses in 2009. Rooting zones will be examined during the next two growing seasons to determine if action of the auger in the hard dry soil at seeding time impedes future root development. Would other planting strategies (eg. soaking holes with water before seeding) have been beneficial?

Photo taken August 2011

The trees continue to be maintained for demonstration purposes. A total of 17,315 trees were delivered to the Special Areas through the Shelterbelt Program for planting in 2008, 11,770 in 2009, 23,365 in 2010 and 39,840 in 2011.

There are currently 12 different species of trees and shrubs growing in the CARA Shelterbelt Demonstration/Oyen Tree Nursery. These are listed below along with a short description of each. For more information on these trees and others please refer to *Shelterbelt Varieties for Alberta*, published by Agriculture and Agri-food Canada (Agdex 277/33-1).

Colorado Spruce

Colorado Spruce is native to the Rocky Mountains of the United States. This coniferous tree has a pyramidal shape with a tight, closed canopy. The lifespan of these trees is anywhere from 50 to 100 years. A mature tree can reach a height of 25 metres (80 feet) and a spread of 6 metres (20 feet). Colorado Spruce is adapted to a wide range of soils and can survive short periods of low moisture. They cannot tolerate periods of flooding. These hardy trees prefer to be planted in full sun, but can withstand some shade. The annual growth of these trees is very slow during the first few years but increases annually.

Green Ash

Green Ash has a straight, single trunk with a high, open crown. Leaves are late to appear in the spring and are among the first to drop in the fall. A mature Green Ash can reach heights of 12 to 20 metres (40 - 65 feet) and will spread up to 9 metres (30 feet). These attractive trees have a lifespan ranging from 50 to 90 years. Green Ash are adapted to a wide range of soils including wet, alkaline and drought conditions. They prefer to be planted in full sun, but will tolerate some shade.

Manitoba Maple

Native to the eastern prairies, Manitoba Maple has an upright, spreading and open form. When mature these trees reach a height of 12 to 17 metres (23 - 40 feet) and have a spread of 11 metres (36 feet). Commonly found along streams and wooded valleys on the prairies and parkland these trees are adapted to most soils and can withstand drought periods and extreme climatic conditions.

Chokecherry

Chokecherry is a large deciduous shrub or small tree with a mature height of 4 to 8 metres (13 - 26 feet) and a spread of 5 metres (17 feet). Chokecherries prefer a loam soil and can withstand some shade and periods of low moisture. They will survive extreme climatic conditions. Clusters of white flowers occur in early June that develop into cherries from early July to September. Chokecherries grow wild along

coulees, riverbanks, thickets and open woods.

Villosa Lilac
Native to Northern China and Mongolia, Villosa Lilac performs well in all regions of the prairies. A large, coarse shrub with a rapid growth rate, Villosa Lilac can reach heights of 3 to 5 metres (10 – 16 feet) with a spread of 2.5 metres (8 feet). This hardy shrub can live more than 50 years. Villosa Lilac grows best in well drained clay or loam soils. It does not do well in sandy soils and does not tolerate poorly drained sites. Villosa Lilac is very drought resistant and prefers full sun.

Hawthorn
Native to eastern Canada, this wide spreading dense shrub reaches a maximum height of 4 metres (13 feet) in a 40 year lifespan. Hawthorn are adapted to all eco-regions but prefer rich, moist, well drained soils. This hardy shrub prefers full sun but can tolerate some shade. Clusters of white flowers develop on the tips of the branches in spring, followed by small apple like fruit. The fruit will often stay on the trees during winter. Hawthorn are found on the slopes of coulees, in river valleys and in open woods.

Sea Buckthorn
Sea Buckthorn is a large deciduous shrub growing to a mature height of 4 to 6 metres (13 – 20 feet) and a spread of 3.5 metres (15 feet). Sea Buckthorn has an irregular shape with spiny branches and showy orange-yellow berries persisting through the winter. Sea Buckthorn prefers sandy soil and is intolerant of shade. It can also survive drought conditions and alkaline soils.

Silver Buffaloberry
Native to the prairies, Silver Buffaloberry has a spreading growth habit that suckers freely and forms a dense irregular hedge that reaches a height of 4.5 metres (14 feet). Silver Buffaloberry prefers moist, well drained sites but will grow reasonably well on drier sites. They will tolerate infertile soil because it has the ability to fix and assimilate atmospheric nitrogen. Silver Buffaloberry is drought tolerant and will grow in moderately saline soils.

White Spruce
White Spruce is a dense evergreen that can grow to a height of 25 metres (80 feet) and spread up to 6 metres (20 feet). It has been known to have a lifespan of 50 to 100 years. Found throughout North America, White Spruce is adapted to a wide range of soil types but prefers well drained, slightly dry soils. It can withstand periodic flooding but will not do well if left in standing water for long periods. White Spruce can also survive brief periods of low moisture but will not last on dry sites.

Ponderosa Pine
Ponderosa Pine is a large-crowned tree with a straight trunk, usually about 25 to 30 metres (80 - 100 feet) tall, but sometimes reaching a height of 50 metres (165 feet). Mature Ponderosa Pines can be easily identified by their distinctive orange-brown bark which is arranged in large plates. The dark yellow-green needles are 5-10" long and

grow in clusters of three. Ponderosa pine grows on a variety of soils, from extremely dry to well-drained, relatively deep, moist soils. Ponderosa pine has a long, deep root that enables it to access the deeper, moister soil. The long root also makes it quite wind-firm. These trees can live as long as 400 to 500 years.

Lodgepole Pine

Lodgepole Pine is a tall, narrow evergreen that can grow to heights of 25 metres (80 feet) with a spread of 6 metres (20 feet). Lodgepole pine can live up to 100 years. It is adapted to a wide range of sites but prefers well drained loamy soils. Lodgepole Pine is tolerant of shade but cannot survive on saline soils.

Red Pine

Red Pine grows best in light, sandy, well-drained soils that are relatively low in nutrients. It does not tolerate urban conditions very well or shading by other tree species. Red pines grow very rapidly for their first 60 or 70 years of life. They can live for up to 350 years and reach heights of 120 feet and diameters of up to three feet. The young pine seedlings need intense, direct sunlight in order to grow.

2012 Insect Forecast

The following information was taken from Alberta Agriculture's Alberta Insect Pest Monitoring Network Home Page as prepared by ARD Entomologist Scott Meers.

"*The past year was a relatively quiet one on the insect front; however, things never stay the same in the insect world and 2012 has the potential to provide challenges in several areas*," says Scott Meers, provincial Pest Management Specialist with Alberta Agriculture and Rural Development. "*Annual surveys are carried out for seven insects, the pests that historically pose problems in one part of the province or another*."

Bertha Armyworm – Bertha armyworm (*Mamestra configurata*) was monitored in 2011 using a network of pheromone-baited traps placed in 146 locations throughout Alberta. Pheromone traps are used to determine the density and distribution of moths. This network of pheromone traps is organized by AARD but individual traps are managed by a wide range of cooperators. *(Note: CARA manages one trap site).* Without dedicated and willing cooperators such a comprehensive monitoring system would not be possible. Overall numbers of BAW moths remained below the first alert level but many trap catches were elevated over the previous year. **The bottom line is a real potential for BAW problems exists in 2012.** The 2012 bertha armyworm survey will be very important in determining the risk.

Bertha armyworm 2012 survey results will be coming in mid June when the new survey season starts. Potential damage from bertha armyworm may be more or less severe than suggested by the moth count data depending on weather and crop conditions and localized population dynamics. An insecticide application is recommended when the larval numbers meet the economic threshold. For pesticide options visit Alberta Agriculture's Pesticide Selector.

Bertha armyworm populations are normally kept in check by such factors as weather and natural enemies. Generally parasitism rates of 50 - 60 percent in bertha larval populations have indicated the end of a local outbreak. Cumulative moth counts in traps during June and July help determine the level of risk for August. The results from 2011 suggest that bertha armyworm has been through the low part of the cycle and may be making a recovery. It is advisable for farmers to watch the maps and stay updated as the coming growing season progresses.

Eight locations in 2011 were in the first warning level of Uncertain. These sites were over a wide range from Fort Vermillion through central Alberta and as far south as Vulcan. Control operations were required in the northern Peace region and in several fields in central Alberta. Cumulative moth counts in traps during June and July of 2012 will give us a much better evaluation of the population and therefore the risk in August.

Diamondback Moth – Diamond back moth is primarily a pest of canola in western Canada but in other parts of the world it is also a serious pest of various crops in the mustard family. Diamond back moth rarely overwinters in western Canada so major

outbreaks are often the result of migrations from United States and warm dry conditions that allow multiple generations to develop.

In order to assess the population, a network of 25 monitoring sites has been established across Alberta. *(Note: CARA manages one monitoring site)* This network is meant to act as part of an early warning system for diamond back moth and should be used in conjunction with crop scouting. The insect makes up to three complete life cycles in Alberta each year. The monitoring indicates the number that show-up early in the season and from there, predictions on how severe the potential problems could be. There is usually only about two to three weeks advance warning for this pest, due to its lifecycle patterns.

Diamond back moth counts were very low at the Special Area site monitored by CARA in 2011.

Cabbage Seedpod Weevil – Cabbage seedpod weevil was first found infesting canola in southern Alberta in 1995, since then, the weevil has spread to south-central Alberta and southwestern Saskatchewan. The distribution and abundance of the cabbage seedpod weevil have been monitored yearly in western Canada since 1997. Predictive models based on climate data indicate that this pest will eventually disperse to all regions of canola production in western Canada, including the Peace River region.

The 2011 survey covered all the canola growing areas of Alberta with over 320 fields sampled in 44 municipalities. 10 sites were surveyed by CARA. The cabbage seedpod weevil is still only found in the southern areas of the province. There was no significant expansion of the cabbage seedpod weevil range in Alberta in the past year. The northern limits of the range include (from west to east) Rocky View County, Kneehill County, Special Areas 2, Special Areas 3 and the MD of Acadia. Producers in Wheatland County had to consider control for the first time in 2010. The cabbage seedpod weevil is still not found in central Alberta or in the Peace River region.

While this is not a true forecast, the numbers of weevils found at most sites south of Highway 1 have the potential to result in economically damaging populations in the next growing season. Cooler temperatures and rainfall in August favors the development of the new generation of weevils and may lead to higher numbers in 2012. **Any producers that grow canola in southern Alberta and into the south portion of central Alberta will have to check their canola crops as they come into flower.** The earliest flowering canola crops tend to have the highest risk from cabbage seedpod weevil and should be monitored very closely.

Cabbage seedpod weevil overwinters as an adult so the risk of infestation is further indicated by the adult population of the preceding fall. High numbers of weevil adults in fall will likely mean significant infestation levels in the following spring. The cabbage seedpod weevil takes roughly eight weeks to develop from egg to adult. Development

time will vary somewhat depending on weather conditions, especially temperature. There is one generation per year.

Crop damage from cabbage seedpod weevil can occur from:

- bud-blasting (potentially reducing yield in dry years)
- larval feeding within developing pods (larva consumes about five seeds)
- premature shattering of damaged pods
- new generation adults that emerge in the fall feeding on nearly developed seeds. The larval feeding alone can result in yield losses of 15 to 20 percent in each pod infested.

Cabbage seedpod weevil adult abundance is best monitored by using sweep net samples. Sampling should begin when the crop first enters the bud stage and continue through the flowering period. Select ten locations within each field, and at each location count the number of weevils from ten 180 degree sweeps. Sampling locations should include both the perimeter and interior of the field to obtain a representative estimate of weevil numbers throughout the field. This monitoring procedure will also give an indication of the number of lygus bugs present and may serve as an early warning for lygus damage, provided that the same fields are monitored into the early pod stage.

The 2011 cabbage seedpod weevil survey was carried out by Alberta Agriculture and Rural Development with support from the Applied Research Associations (Southern Applied Research Association, Chinook Applied Research Association, Lakeland Applied Research Association, Battle River Research Group, Gateway Research Organization, and Smoky Applied Research and Demonstration Association) and the toll free number **310-2777** (**A**lberta **P**est **S**urveillance **S**ystem).

Wheat Stem Sawfly – The area at risk of economically significant sawfly populations in 2012 will be smaller than last year. The 2011 field margin survey shows low populations in most of the area surveyed including the traditional sawfly areas in the Special Areas. The damage ratings are based on 50 fields in 13 municipalities (CARA surveyed 7 sites). Some areas of southern Alberta still have populations that are high enough to result in significant damage to wheat crops. The highest populations of sawfly were found in Newell and Forty Mile counties. Overall this is the lowest level of sawfly concern since the outbreak began over 12 years ago.

The Wheat Stem Sawfly Map is based on cut stem counts conducted after the 2011 harvest. The percent of stems cut by sawfly gives an indication of the number of reproductive adult sawflies that will emerge in late June through early July. Winter conditions have very little impact on sawfly populations and a high proportion of wheat stems cut in the fall will produce adults. Producers in areas with moderate to high levels of cutting should consider using solid stem wheat as a control strategy.

Female sawflies lay eggs inside grass and grassy crop stems; the eggs hatch and tunnel inside stems until near harvest. As the crop starts to ripen the sawfly larva migrates to the stem base and cut a notch most of the way through the stem. Feeding

damage from the tunneling can result in hidden yield losses of 10 to 15 percent. Further yield losses can occur from lodging at harvest.

It is possible that population hot spots still exist in areas of lower risk, individual producers need to be aware of the potential risks in their own fields. Cutting levels higher than 10 to 15 percent in the previous crop indicate the need to consider seeding solid stem wheat to reduce sawfly losses. It is important farmers evaluate their individual situations in making their variety choices. Parasitism can reduce populations and reduce the level of cutting. A parasitic wasp, *Bracon cephi*, has been shown to have significant impact on sawfly populations. The use of solid stem wheat varieties and the increase in parasitism are the major factors in lower sawfly populations in Alberta.

Wheat Midge – The Alberta wheat midge forecast for 2012 indicates an increase in the range of wheat midge occurrence. Overall midge risk for 2012 will be lower than in 2011. Many areas show a lower wheat midge count in the annual survey. Some areas, however, show an increase over previous years. Pockets of moderate risk remain through much of central and southern Alberta. Throughout central and southern Alberta and there is the risk that individual fields could have a high population even if the forecast in the area is low. Wheat midge was confirmed in the Peace region in the past year although the survey indicates that midge levels remain low. **Producers throughout Alberta will need to monitor their fields in 2012.**

The 2011 fall survey included wheat growing areas throughout Alberta. The survey was expanded to include all dryland and irrigated wheat growing areas in southern Alberta. In addition, in response to reports of midge in the Peace region the survey was expanded to that area as well. 9 sites were sampled by CARA and a total 290 samples were taken in 59 different counties. The survey involves taking soil samples from wheat fields after harvest using a standard soil probe. The larval cocoons are then washed out of the soil samples using a specialized series of screens. The larvae are counted, and then dissected to determine if they are parasitized. The midge density displayed on the forecast map is based on viable (live, non-parasitized) midge larvae.

This forecast is not intended to take the place of individual field monitoring. The forecast for Alberta shows areas of risk of midge damage for 2012. It is important to note that over such a wide range, populations in individual fields can be and often are highly variable. Producers should plan on monitoring their fields when the midge adults are flying and the wheat is in the susceptible stage. **In all areas where wheat midge is present growers are urged to monitor wheat fields during the susceptible period (from when any part of the wheat head is visible until anthesis).** Regular field scouting on multiple nights in succession is important in understanding the population in a particular field.

Although a number of factors influence the over-wintering survival of the midge, the survey and map provide a general picture of existing densities and the potential for infestation in 2012. Climatic conditions, mainly temperature and moisture, will ultimately

determine the extent and timing of midge emergence during the growing season. Temperature and wind also play critical roles in egg-laying activities of the adult female midge. The level of damage from wheat midge is determined by the synchrony of wheat midge emergence and the number wheat midge and timing of wheat susceptibility.

Pea Leaf Weevil – The annual pea leaf weevil (*Sitona lineatus L*.) survey was carried out in late May and early June, 2011. Pea leaf weevil (PLW) damage of concern was found in essentially the same range as surveys in previous years. Damage once again increased in severity in Wheatland county but otherwise the damage is similar and in similar areas to previous years. The 2011 survey was based on damage ratings in 121 fields from 27 municipalities. In each field the total notches per plant are counted on 50 plants (10 plants in 5 locations near the field margin). The damage rating for a particular field is the average number of notches per plant.

Some VERY low levels of feeding damage were once again found in Red Deer, Stettler, Paintearth and Provost counties as well as Special Areas 4. This damage is so low that there is no risk of serious issues with pea leaf weevil in 2012. This area is almost exactly the same as previous years and although this is recent range expansion the damage rating numbers are still exceedingly low. It will be important to watch the development of these populations over the next few years.

For any producers south of Highway 1 plus the counties of Wheatland, Newell and Cypress there is risk of damaging levels of pea leaf weevil in 2012. This is very similar to the area from the previous year's survey. Producers should use this information along with their own experience to plan control strategies such as seed treatment for the 2012 crop year.

Although this is not a strict forecast, experience from the last couple of years has shown us that the higher the damage rating in this survey, the higher the risk of damage in the next year. Based on studies of pea leaf weevil biology, moisture in August appears to be a significant predictor of changes in population. Together this information suggests that pea leaf weevil has the potential to be an important pest in 2012.

Spring weather conditions have a large impact on the timing and severity of pea leaf weevil damage. When warm conditions (>20 C) persist for more than a few days in late April or early May the weevils arrive in fields early. Early arrival corresponds to the potential for higher yield losses. In years where cool weather persists, the arrival of PLW can be much later and the resulting yield impact appears to be lower especially when the crop advances past the 6 node stage before weevils arrive. In every case control decisions should be made on a field by field basis. Those who were fighting this pest in 2011 will need to continue in this coming year. Seed treatment for this pest is the best preventative measure producers can take.

Grasshoppers –Grasshopper populations follow the weather, so depending on the spring temperatures and precipitation, producers will see populations accordingly.

The 2012 grasshopper forecast is based on adult grasshoppers counts conducted in early August of 2011 at over 1600 sites by participating Agriculture Fieldmen across the province. These adult counts give an indication of the number of adults at the end of the season that are capable of reproduction and egg laying. Counts in south and central Alberta showed quite low populations and the risk in north central Alberta is variable. Environmental factors, particularly spring temperatures and precipitation, can result in higher or lower actual populations than forecast. Individual producers need to be aware of the potential risks in their area and monitor fields in order to be prepared to make the appropriate decisions to implement control measures. On individual farms, particular attention should be paid to areas that traditionally have higher grasshopper populations. In addition, grasshoppers tend to lay their eggs near areas of green growth in the fall that will provide potential food sources for emerging young the following spring. Areas with early green plant growth such as field margins, fence-lines and roadsides are also areas that will give early indications of potential grasshopper problems.

If insecticides are needed, note label precautions regarding user safety, proper application techniques and instructions to reduce impacts on non-target organisms. It is important to remember that control measures are intended to protect the crops from economic damage and are never successful in totally eliminating grasshopper populations.

Alberta Agriculture and Rural Development acknowledges the commitment and support of the Agriculture Fieldmen across the province in conducting the surveys essential to the creation of this forecast. This survey was coordinated by Maureen Vadnais and data management was done by Pam Retzloff, both of Alberta Agriculture and Rural Development.

For more information and to view the survey and forecast maps for the above insect pests, visit the Alberta Insect Pest Monitoring Network homepage at www.agriculture.alberta.ca/bugs-pest.