

# Alaska Biofuel Plants

## Past, Present, and Future



### Can Plants Become A Future Fuel For Alaska?

#### Alaska Plants for Biofuel

- Past Uses of Plants
- What has worked?
- What has not?
- Present Research
- Which Plants
- How to plant willows
- Future Hopes
- What Can You Do?

#### The answer is ....Maybe!

The questions are who, what, where, how, and when. Does this sound familiar?

The who may be farmers with fields that aren't being used; or rural communities where the cost of fuel is too high; or urban communities with too many dead trees.

The what may be grasses, trees, shrubs, algae, or other plants.

The where may be on the hillside in Anchorage; or on fields in Southcentral or the Interior; or on small homesteads in Bethel; or on large commercial farms.

The how may be by cultivating willows or grass; it might be by shredding trees into chips; it might involve moving logs or chips a long ways; it might be by pruning plants on your own land; it may involve a whole community funding a wood pellet fuel processor—all of these questions need to be researched to find out what will work best.



### What Is Biofuel?

Biofuel is any fuel derived from a recently living plant. All of us have used wood at one time to create warmth, whether at a campfire or in a woodstove. We have seen pictures of fires rushing across a prairie or burning down whole forests.

How can we harness this fuel to create a heat source or energy source? Research and practices in other countries and in the lower 48 have found biomass of certain plants that can be processed into liquid fuel, burned to create electricity, compressed into pellets, combined with coal to produce an entirely different fuel, or chemically converted into a syn-gas.

Most of the plants used elsewhere do not grow in Alaska. However, some do. Which ones will work in Alaska's climate?



Seaweed

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### What hasn't worked and what has in the past?

#### We learn from others.

Many places are growing grasses and other plants for biofuel. Problems have occurred because many of these plants take up crop space which is needed for food. Also, air pollution has been caused by the way the fuel is being used. And, the funding for these efforts have been lost.

In New York and Sweden research and practical applications have shown that woody plant cultivation (especially willow and poplars) are economic, renewable, and with newer processing machines, can be of less threat to the environment.

In Alaska, several sources of plant material are working as biofuel. Seaweed, beetle-killed trees, dead wood from fires, and wood waste from sawmills are all being



successfully used in several Alaskan communities, including Craig, Kasilof, and Tanana.



#### What plants can be used in rural areas for biofuel?

#### How can this biofuel be transported to off-the-road communities at a cheap price?



'Sourdough' Bluejoint Reedgrass growing at the Alaska Plant Materials Center in Palmer, Alaska—one grass that is being studied for biofuel.

Research at the University of Alaska Fairbanks (UAF), School of Natural Resources and Agricultural Sciences, is looking at the chemistry of many different plants in Alaska. Those of us who use wood stoves know that spruce burns differently from birch. Each plant has different chemicals—some might be good for food, others might be good medicinally.

This is true for which plants may create better burning pellets or may be able to convert to some sort of bio-oil.

This research requires the scientific process of investigation. It takes time. Plus, Alaska plants are different from plants found elsewhere. Many questions need to be answered before a solution may be found for a good fuel alternative.

### Present Research

There may be many different types of plants that can produce the biomass needed to create biofuel. UAF is studying 11 different willow species, 7 other woody species, 10 grass species, fireweed, cat-tails, and rhubarb.

How far apart should these plants be spaced for the best production of biomass? When should the plants be cut to produce the optimal chemicals? How can the crops be managed for renewability? Which plants can be burned efficiently so as to not harm our air quality? What kind of soil can these plants be grown in? Can they be grown in the Arctic or Western Alaska?

Through the efforts of UAF and the Alaska Plant Materials Center (PMC), as well as by other interested farmers, we hope to find some answers.

## How To Plant Willow or Poplars for a Crop or Revegetation Project

Willows have been used for revegetation projects here in Alaska for many years. Because of their success and ease of planting, many people believe that willows may be able to produce high yields of wood in a short amount of time. Willows have also been extensively studied as potential biofuel crops in New York, New England, Sweden, and Canada.

Because of the amount of interest in growing willows here in Alaska, the following presents the best management practices from the PMC.

First: Harvest willow whips from wild areas while the willows are still dormant (no pussy willows or leaves showing.) Make sure you know who owns the land where you are harvesting and acquire appropriate permits if needed. Also make sure that you can identify the willow correctly. The willows which are used most often for revegetation projects here in Alaska are Feltleaf, Pacific, Barclay, Sitka, Undergreen, Little Tree, and Diamond Leaf. Balsam Poplar, Cottonwood, and Red Osier Dogwood will also grow well as dormant woody plants.

A whip is between 4—10 feet tall and between 1/2 to 2 inches in diameter. The small tips at the top should be cut away.

Storage of the whips needs to occur in a place that is about 32 degrees. This can be under a bank of snow or by refrigeration. A 60-70% humidity level is important also. Do not trim whips until you are ready to plant.

Make your plans before the ground gets warm. Planting should occur as soon as the soil thaws.



To plant dormant woody plants, cut the whips into stakes 10-18 inches long with at least 4 leaf buds. Using a shovel, rebar, or drill create a hole for the stakes to be placed into. 3/4 of the stake should be in the ground and no more than 2 buds should be out of the ground. Stomp the stakes firmly in place. Keep the stakes watered well throughout their first season.

For the biofuel trials at the PMC and UAF School of Natural Resources and Agricultural Sciences, plots were laid out with 4 replications of three different plants—feltleaf willow, pacific willow, and poplar. We planted the stakes two feet apart on lines that were three feet apart. We will see whether this spacing will provide a good crop for pruning the wood for biomass. If you are trying this, keep records! The more we know, the better our efforts for all Alaskans!

For more information on revegetation techniques, please use the following books:

“Streambank Revegetation and Protection, A Guide for Alaska, 2005” by Walter, Hughes, Moore, and Muhlberg. This can be found on line at: <http://www.sf.adfg.state.ak.us/SARR/restoration/techniques/Techniques.cfm>.

“A Revegetation Manual for Alaska” by Stoney J. Wright. This can be found on line at: <http://www.dnr.state.ak.us/ag/RevegManual.pdf>

There are many plant identification books. For willows and shrubs, refer to:

Collet, Dominique M. 2002. “Willows of Southcentral Alaska.” Kenai Watershed Forum, Kenai, Alaska. 109 pp.

Collet, Dominique M. 2004. “Willows of Interior Alaska.” US Fish and Wildlife Service, Fairbanks, Alaska. 111 pp.

Viereck, Leslie A. and Elbert L. Little, Jr. 1986. “Alaska Trees and Shrubs.” University of Alaska Press, Fairbanks, Alaska. 265 pp.



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## Future Hopes

We are all caretakers of the earth. We need to make sure that our efforts to discover renewable energy sources from plants will not hurt the environment.

As Alaskans we have the opportunity to create economic opportunities for rural communities and farmers.

We hope to discover plants which can be alternative, renewable fuel sources.

We hope to find solutions which will not injure our atmosphere.

As we all work together towards this project, let's be a model for the rest of the world!



**Call and write your representatives and ask them to support biofuel research!**

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## What Can You Do?

The Alaska Wood Energy Development Task Group was formed in 2004 to seek opportunities to support and utilize wood energy. This Task Force is made up of the Alaska Region State and Private Forestry, Alaska Energy Authority, and seven other agencies and organizations. The Task Force funds feasibility studies and projects (for more information go to <http://dnr.alaska.gov/forestry/wood/index.htm>). Or, contact Steve Patterson, State & Private Forestry, 907-743-9452 or Dan Parrent, Juneau Economic Development Council, 907-747-5688.

The Matanuska-Susitna Borough is funding research into woody plants for biomass. Through a seed grant to the PMC and UAF, studies of several different willows and poplars were started in the summer of 2008.

Fairbanks Borough and Economic Development Corporation are conducting a forest inventory to learn what woody plants may be available for producing wood pellets to be used for heat.

Many Native Corporations and rural villages are interested in finding solutions to the high cost of fuel. Contact Jeff Graham, State Forestry, 907-761-6309 for more information.

If you are planning to clear-cut an area call UAF Extension before-hand so that the biomass before and after the cut can be measured. The more data that can be gathered will help research whether plants can provide the biomass or the right chemicals for an economic biofuel endeavor here in Alaska.