

# Making Sugar Cane Syrup in the Kettle

Procedures/Methods of making sugar cane syrup in a cast iron kettle as practiced by W. Olin Pope, Pope Farm, Pope Road and Georgia Hwy. 33, Barwick, GA

Notes by Wesley O. Pope  
November 2002

The following are notes taken of my father's kettle setup and method of making sugar cane syrup in a cast iron kettle. My father, W. Olin Pope, Barwick, Georgia, (age 91 at this writing -- and still making syrup) uses the techniques and kettle arrangement taught to him in the early 1900's by his grandfather, Marian E. Pope. Marian Pope made syrup on two 16-foot steam evaporators and used a kettle to make sugar.

My father makes syrup in a 100-gallon kettle fired with diesel fuel using an oil burner (U.S. Carlin, mfr.) once used in a tobacco barn. The kettle is configured with two rings (1/8" x 4" flat steel bar). One ring is placed (set in mortar) on the outside rim of the kettle when the kettle is set in the hearth and sealed to make watertight. An inside ring, which is removable, is made to set on the inside edge of the kettle rim --this inside ring is raised and lowered by a pulley system as needed. The double-ring arrangement allows the kettle to function much as an evaporator (See page 7 on kettle setup.). That is, the juice foams over the inner ring, collects between the inner and outer rings where the dregs (skimmings) are removed as the juice cools and reenters the kettle under the inner ring.

Equipment, Tools, and Accessories Used in the Syrupmaking Process Include:

- A Goldens' New Model No. 27 horizontal cane mill powered by a 1928 Model "A" Ford power unit -- used to crush and extract the juice from the sugar cane stalk.
- A holding tank to contain the cane juice during grinding. The tank is fitted with a croker (burlap) sack filter to remove coarse cane stalk residue (fibers) from the juice as the juice exits the mill and enters the holding tank.
- A 100-gallon cast iron kettle (Kehoe's Iron Works, Savannah, GA, mfr.).
- An open/semi-open impeller centrifugal pump (Pacer, mfr.) is used to move juice from the holding tank to the kettle.
- A wire brush with a long wooden handle affixed that allows reach to the far side of the kettle which is used to scrub down the kettle with hot water between boilings.
- A large perforated, shallow cone-shaped skimmer on a long wooden handle that allows reach to the far side of the kettle. This skimmer is used primarily for the initial skimming -- prior to establishing juice flow over the inner ring and to check the thickness of the syrup. The skimmer is fabricated of thin

galvanized metal (orig. mfr.) and is 13 ½ inches in diameter and 2 inches deep at center with 1/16 inch holes (apx.) punched in a widening concentric circular pattern (apx. ½ to 1 inch row spacing from bottom to top). The holes are punched closest at the bottom (apx. ½ inch in line) to about 1 inch in the outer circles.

- A small perforated, rectangular-shaped skimmer (6 inches long, 3 inches wide, 1 ½ inches high in the back tapered to ½ inch high in front with an 18-inch wood handle affixed to the back). This skimmer is used to remove the "skimmings" that accumulate between the inner and outer rings.
- A large dipper made from a 4 ½ quart stainless steel saucepan with a long wooden handle affixed that allows reach to the far side of the kettle. This dipper is used to clean the juice during cooking by the addition of water and/or baking soda. It is also used to dip the syrup from the kettle and to clean the kettle between boilings.
- A small dipper (apx. 1 cup) used to add lemon juice to the sugar cane juice and syrup to the hydrometer test tube.
- A Baume scale for syrup, Temp. 60° F (0 - 50) which is a hydrometer for checking the thickness (specific gravity) of the syrup.
- A "buck" barrel -- historically, was a wooden barrel with the top open and a bung hole approximately 2 inches from the bottom of the barrel to draw off the beer. The juice skimmings along with cane bagasse were placed in the barrel, sometime adding cracked corn, yeast, and allowed to ferment and form "buck" or beer. Currently, the buck barrel is a stainless steel beer keg with one end removed and the bottom fitted with 1 1/4 inch plumbing to allow the skimmings to flow out onto the ground behind the syrup house.
- A stainless steel tub (tank) to hold the hot syrup fitted with a faucet for bottling the syrup.

#### The Cooking Process:

Sugar cane syrup is made by evaporating cane juice to concentrate the sugar content of the juice. This requires a continuous boiling process usually taking three to four hours at about 210<sup>0</sup> Fahrenheit. The juice must be skimmed and clarified throughout the cooking process.

To begin cooking, the juice is pumped from the holding tank into the kettle at a level about one to two inches up on the outside ring and full heat applied. While filling the kettle with cane juice, add about 1 ½ cups of pure lemon juice -- citric acid helps to clean the cane juice and thicken the syrup. During the first minutes of cooking, dregs (residue from the pulverized cane stalk) will begin to rise and allowed to form as a thick dreggy foam (scum) on top of the juice. Prior to the initial skimming, the heat should be closely regulated when first firing up the furnace in order to maintain the accumulation of dregs that form as a thick foam on top of the juice -- without bringing the juice to a boil!

Once ripples are noticed in the foam, immediately reduce the heat and quickly skim the foam (scum) from the juice using the large skimmer--this is the first time that skimming should be done and occurs approximately 30 minutes after firing up the furnace. Alternatively, apply heat and raise the juice temperature to 210 degrees Fahrenheit, remove the fire, and let the juice set for 30 to 60 minutes, then carefully remove the scum. The large skimmer is used for this initial skimming in order to quickly move the scum from the juice surface to the "buck" barrel. This initial skimming is the most important step in cleaning the juice. Again, the heat should be monitored (reduced) to ensure that the juice does not boil vigorously coming through the foam and "roll" the dregs back into the juice making it difficult to adequately clean the juice.

After the initial skimming is completed, the inner ring should be put in place and the full heat restored immediately to bring (raise/boil) the juice over the inner ring. Using the large skimmer, continue skimming the juice until it begins to flow over the inner ring. The large skimmer can be used to "fan" the dregs over the inner ring until an even, consistent juice flow is established over the ring. The boiling action of the juice will force (float) the dregs over the inner ring. The juice will cool as it boils (bubbles) over the inner ring to reconstitute as liquid on the kettle rim. The dregs will then collect/float on the kettle rim between the inner and outer rings where they can be skimmed periodically as they accumulate.

The boiling height of the juice (boiling action over inner ring) must be maintained throughout the cooking process until the juice begins to syrup and "fall" below the inner ring. Maintaining this boiling action/flow over the inner ring is the second most important step in producing clean syrup--next only to the initial skimming. If for any reason this flowing process fails (the dregs moving over the inner ring), the juice should be skimmed of dregs (using the large skimmer) until the boiling height of the liquid can be reestablished. Once the juice begins flowing over the inner ring there is no longer a need to continue skimming the juice surface - periodically skim the dregs as they accumulate between the inner and outer rings. If needed, additional cleaning can be performed using tap water and baking soda after the inner ring is put in place.

The juice can be further cleaned/clarified by "shocking" the juice into a vigorous boiling action which will bring dregs to the surface. The large dipper is used to add tap water (one or two quarts) and/or baking soda (+/- one teaspoon of baking soda to one or two quarts of tap water) to the juice. Do not dump the water and/or water baking soda solution into the juice because the juice may boil over the outer ring! Put the water and/or water baking soda solution into the large dipper, and place the dipper into the center of the kettle. Slowly lower the dipper into the hot cane juice until the rim of the dipper goes just below the surface allowing the dipper to fill with juice. Once the dipper is filled, raise the dipper up and slowly pour the contents back into the kettle. This procedure can be performed as needed before the juice begins to syrup -- usually, in the first one to two hours of cooking. The procedure can also be used to help establish the juice flow over the inner ring. If a too vigorous boil is started -- where the juice wants to go over the outer ring (too

much water/baking soda) -- use the large skimmer to dip/fan the juice until it settles back to the level of the inner ring.

As the juice nears syrup, it will darken and begin to "fall" below the kettle rim usually after approximately 3 hours of cooking. The heat should be closely monitored (lowered) as the juice nears syrup. The thickness/specific gravity should be continuously checked to determine the proper time to perform the "strike" (remove fire from the furnace and take up the syrup). The syrup is cooked to about 33 to 34 on the Baume scale hydrometer. The last few "degrees" should be cooked slowly to prevent burning the syrup causing heat coagulation which appears as a dark brown settlement in the bottled syrup. Heat coagulation is a result of scorching the syrup in the cooking process - cooking too hot and/or too fast. The thickness of the syrup can also be checked in the final stages of cooking by using a flaking technique. Dip the large skimmer into the syrup; as you bring the skimmer out of the syrup, flip the skimmer over end several times to form an even film of syrup over the skimmer. Then, hold the skimmer on edge and allow the syrup to drip/flake off the skimmer -- the longer the "needles" which form, the thicker the syrup. Some syrup can be put in a jar and the jar placed in water to cool and check for thickness.

When the proper degree of thickness is reached, the inner ring is removed, the furnace is cut off, and the damper opened to cool the syrup quickly since the syrup will continue to cook as long as it remains in the heated kettle. For this reason, the syrup should be removed as quickly as possible from the kettle and strained through a clean croker sack, flannel/cloth baby diaper into a holding tank prior to bottling. Though the syrup can be allowed to cool, it should be bottled while still hot. If a dreggy foam appears as the syrup falls, it should be quickly skimmed off using the large skimmer before dipping the syrup from the kettle -- this will occur if the juice has not been properly cleaned during cooking.

Once the syrup is removed, the kettle should be cleaned while still hot being careful not to crack the kettle since cold water/cane juice dumped into a hot kettle could crack the kettle. To clean the kettle, take the large dipper and half fill with tap water and place on the bottom of the kettle; tip the dipper releasing the water slowly into the kettle. Repeat the process until a couple of gallons of water are in the kettle. Use the large dipper to scoop the hot water from the bottom of the kettle and release along the side and rim of the kettle. Next, use the hot water and wire brush to scour down the kettle to remove burnt syrup, etc. The hot water will dissolve the syrup and residue (dregs) remaining on the kettle rim. Dip the residue (dirty water) from the kettle into the "buck" barrel before refilling the kettle with cane juice. After the last cooking, clean the kettle and coat with mineral/cooking oil and cover with a tarp which makes it easier to clean the kettle with just hot water at the start of the next season.

#### Additional Notes on Cooking:

Cane juice can be left in the kettle overnight if the initial skimming is completed before leaving for the night. Juice can sour overnight in the kettle if

not skimmed, as well as in the holding tank, if the weather is too warm. Juice that is too sour must be discarded. However, juice that is slightly sour is easier to cook and produces a clearer syrup; dregs tend to rise easier in juice that is slightly sour. In fact, cane is usually cut down after the first frost for this reason.

Sugar cane which was drought stressed during the growing season or that has been cut down for some time will need to have water (several gallons) added to the cane juice prior to firing up the furnace which will aid in clarifying the juice during cooking.

#### Notes on Making Sugar:

The following is my father's recollection of making sugar in the kettle with his grandfather in the early 1920s. The juice was skimmed and cooked down (apx. 1 hour). The fire removed and the kettle was refilled with juice, skimmed, and cooked down again. Two to three refills were performed before finally cooking down to a heavy syrup.

This process took most of a day and yielded a syrup barrel (30 gallons) of thick syrup. A low fire was maintained under the kettle to keep the syrup hot and fluid while it was being dipped quickly from the kettle into a modified syrup barrel where it would cool and crystallize. The syrup barrel was modified by removing one end of the barrel (the top) with wooden plugs placed in the bottom to drain off the water after the syrup crystallized -- the plugs should be flush with the inside of the barrel so as not to be "seized-up" by the sugar. To keep the syrup from scorching while confined in the cooler (barrel/sugar mold), stir frequently until the syrup has significantly cooled. Some sugar granules can be added to the syrup while hot to help initiate/facilitate the crystallization process. After the syrup has crystallized, the sugar would be chipped out of the barrel and placed in cheesecloth and hung in the smokehouse for further draining/refining. The clumps of sugar were then placed in a coffee grinder to make table ready.

#### Notes on Sugar Cane Culture:

The cane patch is fertilized with cotton seed meal (1 unit) mixed with tobacco fertilizer (1/2 unit) -- cotton seed meal is an organic form of slow release nitrogen. Use tobacco fertilizer such as 06-06-06 or fertilizer made for tomatoes, peppers, Irish potatoes since these plants are in the nightshade family as tobacco - too much nitrogen will give the syrup a salty taste.

Seed cane can be banked in the fall to preserve for planting in the spring. The seed cane should be cut down before a hard frost which will kill the seed "eyes." To bank, cut off cane stalk tops (do not strip, which could damage the "eyes") and cut and pile the stalks in an overlapping fashion on top of the ground. Cover the stalks with the cutoff tops. Finish the bank by encasing the mound of stalks with 2 to 3 inches of dirt, pack tight with the shovel over the sides and top of the bank. The dirt should be dug next to the mound encircling the bank/cane bed with a trench which will allow water to

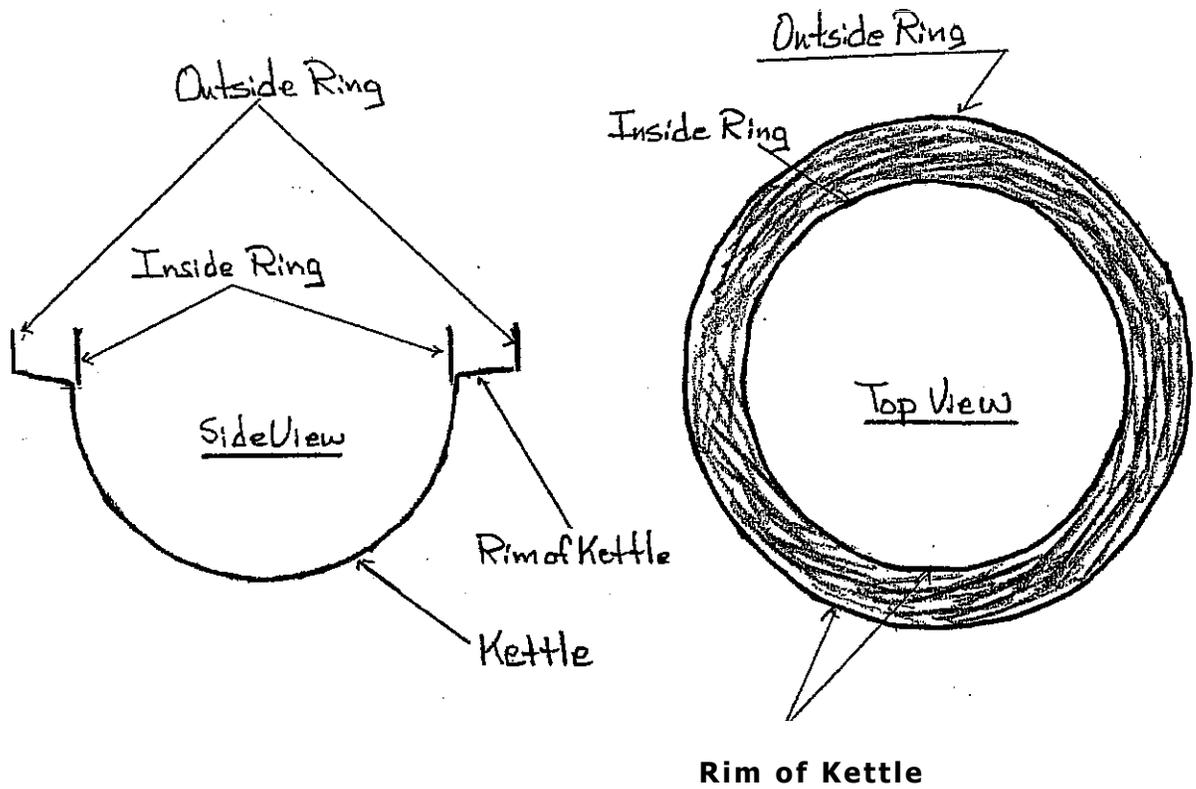
seep away from the bank. In the spring, carefully remove the dirt and tops encasing the cane stalks. Hand strip leaves from the stalk so as not to damage the seed "eyes." Seed cane can be planted whole or cut into shorter sections -- be careful to cut the stalk between the joints avoiding where the seed "eyes" are located. Plant in rows approximately 3 to 4 feet apart laying the stalks end to end or in joints/sections at 1 to 2 feet apart. Sugar cane can grow from the stubble (roots) for several years, or the stubble can be dug up in late winter/early spring for replanting.

Sugar cane should be harvested in the fall, preferably soon after the first frost since a hard frost could kill the stubble. The cane should be field stripped, topped, and cut down close to the ground. A short handle heavy duty eye hoe (eye blade hoe) is ideal to cut down cane close to the ground. The tops and leaves should be left in the field to cover and protect the stubble from frost and cold damage during winter. The debris is removed in early spring by burning off the field.



W. Olin Pope

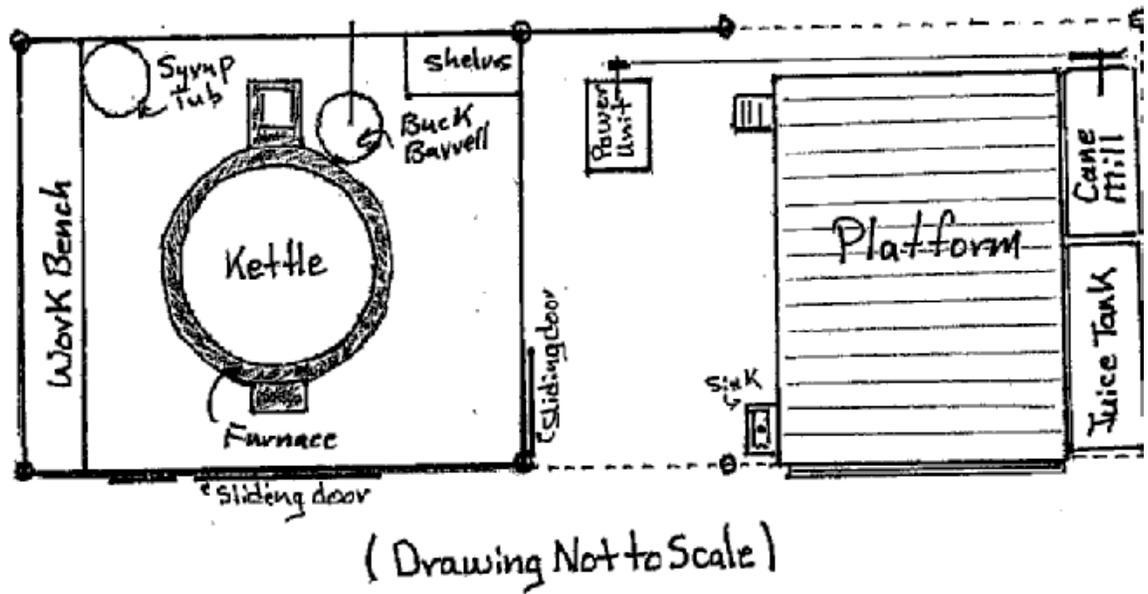
## Syrup Kettle Setup



Notes: The outside ring (1/8" x 4" flat steel) is set in mortar when the kettle is put in place.

The inside ring (1/8" x 4" flat steel) is removable, put in place after the initial skimming and removed before syrup is dipped from kettle.

## Layout of Syrup House



The syrup house is a wood frame and pole constructed building with the kettle totally enclosed. The cane juice is pumped underground from the holding tank to the kettle.

## **ADDENDA**

**“Making Sugar Cane Syrup in the Kettle”**  
**Notes by Wesley O. Pope (11/02)**  
**(Addenda added 11/06)**



## Utensils for Cooking Sugarcane Syrup in the Kettle

### W. Olin Pope Farm, Barwick, Georgia

1. Large Skimmer: This shallow cone shaped skimmer is used primarily for the initial skimming, which is an accumulation of dregs that are allowed to form a thick foam during the first 30 to 45 minutes of cooking. The skimmer is made of thin galvanized metal (orig. mfr.); and is apx. 13.5" in diameter and 2" deep and perforated with 1/16" holes punched in a widening circular pattern (apx. 1/2" to 1" row spacing from bottom to top, and punched closer at the bottom (apx. 1/2" in line) to about 1" in the outer circles.
2. Large Dipper: Made from a 4.5 quart stainless steel sauce pan, it is used to add a small amount of baking soda to the cane juice (helps to clean juice by forcing dregs to the surface and over inner ring), also used to dip syrup from kettle and to add water to kettle to clean the kettle between "boilings", using the wire brush to clean the kettle rim, etc.
3. Small Dipper: Used to add lemon juice to the cane juice and to pour syrup to the hydrometer test tube to check syrup thickness..
4. Hydrometer and Holder: Baume Scale (0 – 50), used to check the thickness of syrup.
5. Small Skimmer and Burlap Strip: The skimmer is used to remove the dregs which accumulate between the inner and outer rings set on kettle rim once juice flow over the inner ring is established. Burlap strips can be laid next to the inner ring to catch/trap the dregs before they reenter the kettle - - in lieu of using the small skimmer.
6. Wire Brush (SS): Used to scrub down kettle with hot water between "boilings". Made by cutting the handle off of a stainless steel wire brush which is bolted to a piece of angle, with the back side of the angle shaped to fit the inside arch of the kettle (for scraping), etc.

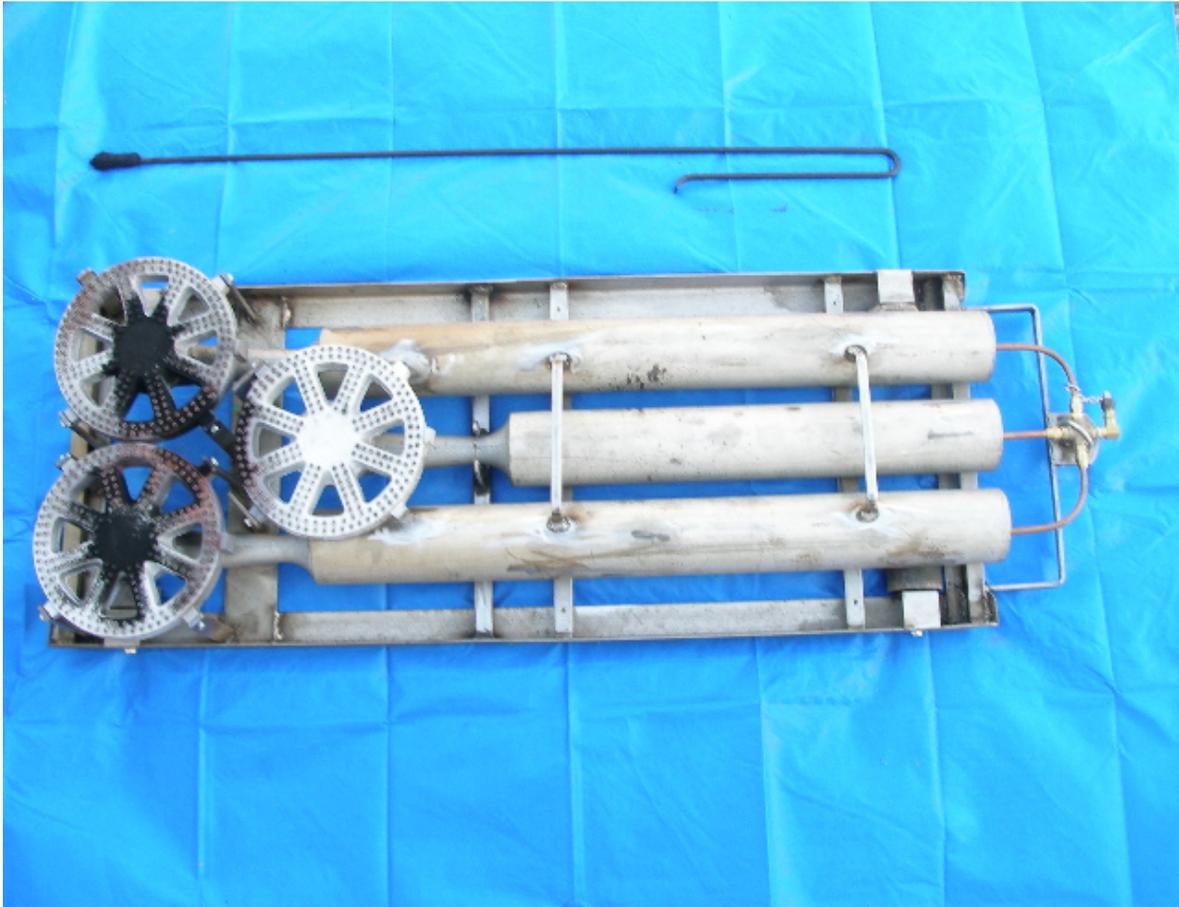
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## **Sugarcane Harvesting Tools**

### **W. Olin Pope Farm, Barwick, Georgia**

1. Cane Strippers: Used to remove cane leaves from the cane stalk prior to topping and cutting down the cane. Used in a single motion by running the stripper down the stalk and pulling the fodder (leaves) out into the center of the row and away from the stubble - - making it easier to cut down the cane.
2. Cane Knife: Used to top the cane, and is also used to strip and cut down cane.
3. Cotton Hoe: A Scovil Hoe, manufactured by The Scovil Hoe Company, Higganum, Conn., and originally made to chop cotton. The handle has been shortened, to elbow length, and is used to chop down cane close to the ground. This type hoe is also known as an eye-hole hoe since the handle goes through the ferrule which, in this example, is stamped into the hoe. The cane stalks should be cut close (level) to the ground surface so that the leaves and tops will cover and help protect the stubble over winter.
4. Scovil /Eye-Hole Hoe: A modern, heavy cast steel Scovil Hoe, with the ferrule cast into the hoe and is used to cut down cane close to the ground.



## **Syrup Kettle Burner**

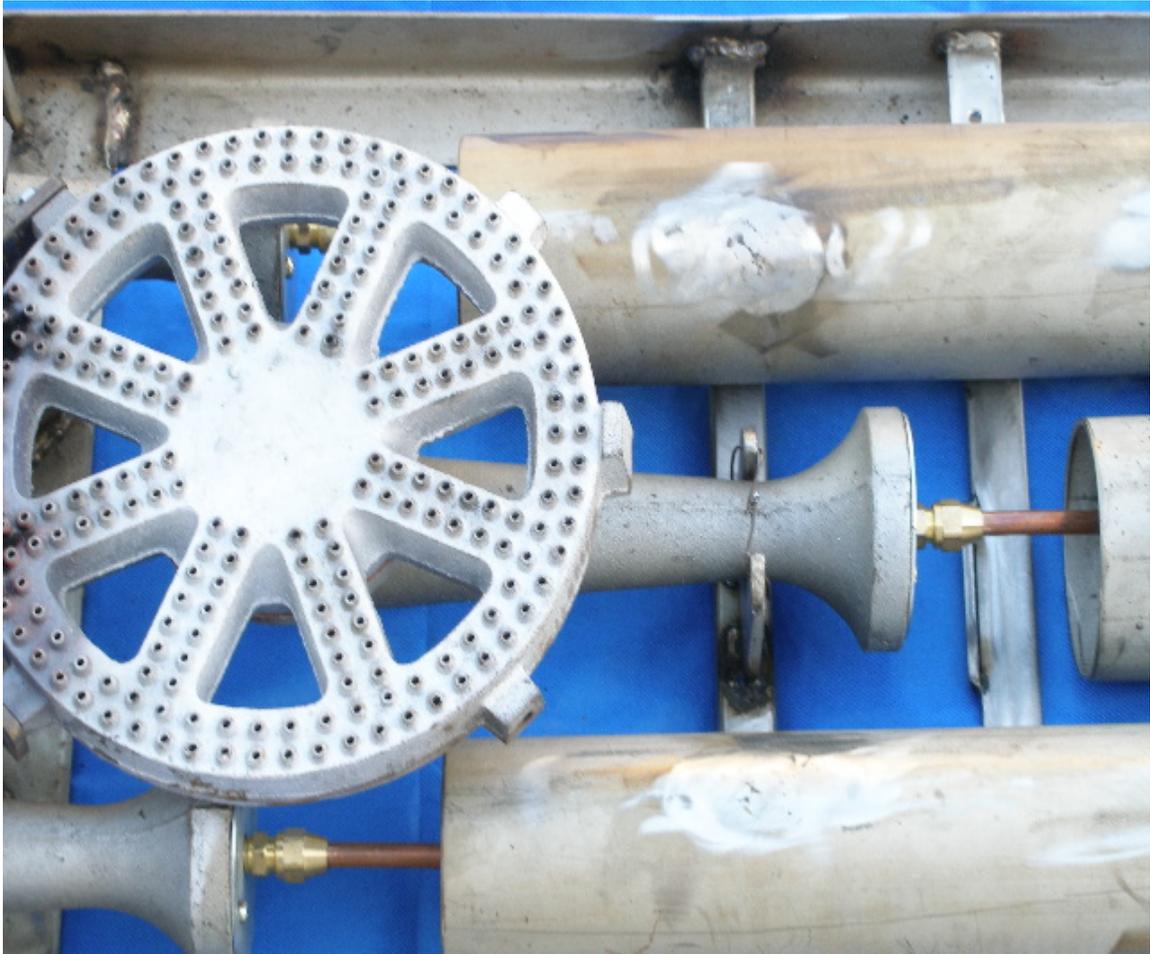
**W. Olin Pope Farm, Barwick, Georgia**

The above burner unit uses three (3) 10" Barbour International 100,000 BTU high pressure, cast Iron burners (Model BG-14), with orifices converted to .0625" (1/16") and 4" air intake tubes which extend to the front of the furnace door. The burners are mounted on an angle iron frame fitted with 3" cast iron wheels. The fuel lines (1/4" ID copper tubing) extend beyond the end of the air tubes to provide space for the tubes to be slid back in order to access fittings and burner air gates.

Above the burner is a igniter stick which is used to light the individual burners. The igniter stick (apx. 4' long) is made of 3/8" steel rod which is folded on one end to form a handle, and flatten apx. 3" on the opposite end, with 2 small holes drilled apx. 2 1/2" apart and twisted 90°, flannel material is wrapped around the rod and secured with wire run through the holes and around the flannel to form a torch. The torch is dipped in diesel and lit by match, etc.

This kettle burner is a replication of a burner unit designed and fabricated by Ralph White, Blountstown, Florida and David White, Altha, Florida for the Panhandle Pioneer Settlement, Blountstown, Florida.

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**Syrup Kettle Burner (Detail)**  
**W. Olin Pope Farm, Barwick, Georgia**

The above photo shows air tubes slid back (open) to provide access to connect fuel lines and make adjustments to air gates – note the rear/center burner is supported from underneath to allow air tubes to slide over the burner air intake openings.



## **Propane Gas Regulator Setup for a Syrup Kettle Burner**

### **W. Olin Pope Farm, Barwick, Georgia**

The above regulator is used to control the gas flow to the kettle burner and as a result, control the heat during cooking syrup in a cast iron kettle. The above regulator is a Belgas, Type P37, LP Gas Regulator (0 – 30 psig) that is both a high volume and high pressure regulator. This example has ½” NPT inlet and outlet ports and two (2) ¼” NPT outlet ports, with a 0 – 30 pound gauge fitted to the rear ¼” outlet. A ½” NPT cutoff valve was added to the inlet side as a safety should the regulator diaphragm fail. Also, an additional cutoff valve ( ½” NPT x 3/8” M Flare) was added to the outlet side of the regulator as an additional safety and operational cutoff to the burner. This regulator is a 2<sup>nd</sup> stage regulator, part of a two stage system, with a 1<sup>st</sup> stage regulator (0 – 60 psig, set at 35/40 psig) located outside at the tank both for safety and to help to prevent freeze-ups at the tank/regulator.

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**Syrup Kettle Burner (Firing at 10 psig)  
W. Olin Pope Farm, Barwick , Georgia**



**Syrup Kettle Burner (Firing at 20 psig)  
W. Olin Pope Farm, Barwick, Georgia**



**Syrup Kettle Burner (Enclosed)**  
**W. Olin Pope Farm, Barwick, Georgia**

At the end of the season, the burners are wire brushed and sprayed, inside and out, with a rust inhibitor (PB Blaster, etc.), then enclosed in the furnace to exclude wasp etc.