



Organic Farming One of Many Ag Growth Areas for Propane

Selling propane to farms for agricultural weed flaming has been a good business line for All American Propane (Yakima, Wash.). The company delivers propane to residential, commercial, and agricultural customers in Washington state. It also operates a transport company that hauls propane for other marketers and to farmers in Washington, Oregon, and Idaho. Although the business sells propane to farmers for flaming, determining just how much of the fuel is dedicated to weed flaming is difficult because agricultural producers use propane for a variety of applications.

“Farms use propane for everything from heating water to motor fuel for trucks that collect the hops, to forklifts that load the fruit onto the trucks,” said Darcy Start of All American Propane. His father, Dick Start, began in the oil and gas business in the 1950s, worked for Heritage Propane and CalGas, and founded All American about 24 years ago. “We sell propane for many different uses on the farm. Irrigation pumps that run on propane, hops dryers, mint dryers, and they also have large boilers that are propane-fired to process the mint. And of course, the wind machines.” Start went on to explain that farmers in his area use high-velocity wind to keep frost off the apple crops. The high-velocity, strategically placed wind machines create their own micro-climate. “The micro-

climate enables the moisture and temperature to be high enough to keep the buds from freezing.” Propane powers the wind machines.

Propane use on farms has continued to be a strong area of growth for the propane industry, and just in the area of propane-fueled flaming alone, Cinch Munson agrees with Start on the diverse uses. Munson, director of agriculture business development at the Propane Education & Research Council (PERC), pointed out that people usually think of agricultural flaming as being used for more traditional organic crops such as soybeans and corn. But to illustrate how diverse propane flaming has become, Start of All American Propane noted that heating greenhouses for marijuana farms has been a growing business in his state of Washington, which has legalized marijuana for recreational use. “We install the heaters for them, run the piping, the gas lines, venting, and supply them with the propane.”

Though such installations are perhaps controversial, the message is, “Don’t limit the view to just the typical agricultural operations,” Munson noted, adding that Flame Engineering and Agriculture Flaming Innovations out of Nebraska are two primary companies offering flame weeding technologies to the market. “There are a lot of different agricultural operations that can use flaming technologies.” He said organic



The Flame Engineering GP-1000 in action.



Manual propane flaming equipment is displayed prominently in the All American Propane showroom.

tobacco is another example of an emerging market for propane flaming that doesn't fall into the traditional crop category.

Organic farming isn't a new trend, but demand for organic and non-GMO (genetically modified organism) products continues to expand as consumers become more food conscious. Because of that, it continues to be an area of growth for propane flaming. Munson explained that the process to qualify as an organic farm is cumbersome. USDA-certified organic farms can't use chemicals for weed or insect control, and only certain seeds and fertilizers are accepted to maintain the stringent certification. There is a 36-month time period between the farm applying to become certified as organic and when the certification is awarded, but that timeframe presents another area of opportunity for propane dealers. During the waiting period, although the farm is not yet certified organic, it must incorporate organic practices.

During that timeframe, the farm can sell crops to the non-GMO market, which Munson noted is a growing opportunity for propane as well. While in the transition phase from traditional farming methods to organic, the farm's ability to sell into the non-GMO market allows the farm to get a modestly higher price for its products than the traditional commodity price.

Nakashima Farms (Livingston, Calif.), which includes about 83 acres for growing organic almonds, is familiar with the process of becoming certified organic. The farm treats the weeds with a single-burner trailer-mounted Flame Engineering orchard flamer that treats the weeds on one side. But that approach is going to change: owner Tom Nakashima said he has ordered a double unit for increased efficiency. "We ordered a double unit, one burner on each side of the tractor. We're going to mount it in the front of the tractor so the driver can watch both flames without turning around and we'll cover twice the area."

When asked why he went into organic farming, Nakashima had a simple answer: "to hopefully make some money. "It's good for the workers, good for me,



Flame Engineering's TD-12 LPS alfalfa flamer is designed to be towed behind a propane tank trailer. The company manufactures units for row crops to blueberries.



Flame Engineering manufactures two complete flaming units for orchard and vineyard applications. The GP-750, a smaller unit designed to hold a 58-gal. tank, is perfect for smaller operations under 40 acres. It has four 1.15-MMBtuh burners.



The GP-1000, designed to hold a 124-gal. tank, was built with larger producers in mind. It has two 3-MMBtuh burners.

and good for the soil," he said. "There was demand for the organic product, so we gave it a try. It worked out all right. We're not getting rich, but we're making a living." Start of All American Propane agreed with Nakashima that flaming is good for the soil. "The key to growing crops is you're trying to not disturb the soil as much as possible, but you have to keep the insects and weeds away as well. Also, not disturbing the soil includes not over-tilling the soil, which causes soil erosion or can cause a loss of a lot of nutrients." He added that flame cultivation "is an acceptable and effective method for weed control with no groundwater contamination. So if you have chemicals and they get into the ground, they can seep back into the irrigation ditches, go back to the water source, and contaminate it."

After his farm used a combination of cultivation and flaming for weeding, Nakashima "came to the conclusion that flame was probably the best way to go. In 2016, we pretty much went to all flame." Flaming has worked out well for the farm, as long as the weeds don't get too tall. The farm uses an on-site 1000-gal. propane tank to fill the unit, and Sierra Propane in Merced, Calif. keeps the tank filled.

Propane's Bright Future In Agriculture

Propane has a strong history in agriculture and has a bright future, said Tucker Perkins, chief business development officer at the Propane Education & Research Council (PERC). Perkins made his remarks during a presentation in November at the World LP Gas Association's World Forum in Florence, Italy.

In a presentation titled, "Agricultural Market Development in the United States," Perkins discussed various applications of propane on the farm, noting that grain drying offers high demand in a short season for propane marketers, with each grain dryer using 20,000 gallons or more per season. Also, a livestock heater can use 30,000 gallons or more per season, and each greenhouse heater can use 20,000 gallons or more. An irrigation engine can use 5000 gallons annually. He showed a prototype New Holland tractor and noted that propane-fueled tractors can offer a 20% to 40% fuel savings compared to diesel.

In another presentation at the World Forum titled, "Steps to Grow Gallons: LPG-Powered Agriculture Tractors," Cinch Munson, PERC director of agriculture business development, noted that the U.S. Energy Information Administration estimates that tractors in the U.S. consume nearly 3 billion gallons of diesel per year. Munson highlighted a partnership between PERC and New Holland Agriculture, mentioning that the two organizations are working on a project to "define the technical feasibility and market receptivity of a propane-powered tractor in two distinct consumer segments that purchase small to mid-range agricultural tractors."

Flame Engineering (LaCrosse, Kan.) is seeing an increase in the use of its propane-fueled flammers for organic farms. "In the past, organic was a fad," said Mel Limon, Flame Engineering's executive director of sales. "Now, it's become a movement." He is noticing more growers switching to organic or more natural farming methods. Organic is a better investment for the farmers because the products are more profitable. Limon is seeing increased interest in Flame Engineering's GP1000 and GP750 propane orchard flammers among organic farmers. Weeds have become more resistant to pesticide chemicals, and flaming is the ideal alternative, which is a main reason Limon sees a trend toward organic farming and the use of flaming for weed control. "Not much can withstand the 2000 degrees of heat," Limon noted.

Start of All American sells to orchard growers of apples, peaches, pears, and plums, as well as farmers growing strawberries, watermelons, and wheat crops.

He has seen various uses of row crop flame weeders. One is called pre-emergent flaming, which treats the soil before the crop is seeded. Another category is post-emergent flaming, which takes place after the seeds are planted in the ground. "That's most critical to organic, because if they get a big crop of weeds that come along, like seeds from another farm that get blown in, they have to find a way to deal with it quickly and effectively or it can spread throughout the crop, and they can't use chemicals to take care of it so they either get 100 field hands out there with hoes or they do flaming." The

peak emergence technique is a third category, which is a combination of pre- and post-emergent flaming. "Then out of these three categories, there are different techniques they use, everything from cross flaming to parallel flaming, middle flaming, and my favorite is water-shielded flaming. That's used in cotton farms, not so much here. Water nozzles drip...water on top of the crop plant to protect it, and there are propane flames on top of the crop and water sprayed on the middle of it. Saturate the fields with water before they flame, which is the most effective way of doing it. You're super-heating the membrane of the weed itself, so the growing membrane bursts but doesn't catch on fire. Water is a good insulator from that heat. It protects soil and plant, 2000-degree heat bursts the membrane of the weeds and kills all the bugs, then the nutrients from the dead weed plant revitalize the soil with the nitrogen and other nutrients that it needs, which is especially important for tobacco because tobacco depletes almost all the nitrogen in the soil. So they flame the field to revitalize the nitrogen in the field so they can grow another crop the next year."

Regulations on the use of pesticide chemicals, especially in California, is another reason for the movement toward flaming weeds, and propane can't leak into the soil, contaminating the groundwater. Although more paperwork is involved with becoming an organic farm, the farm deals with fewer regulations because the lack of chemicals means no residuals and no runoff. "Propane has been tagged as a green fuel," Limon said. "When we flame, we don't create much smoke. Therefore, air quality isn't affected."

Ryan Riffel of K & R Propane in Abilene, Kansas sells propane to organic and no-till farmers that have problems with chemical-resistant weeds and bugs. However, he is in the unique position of also being an alfalfa farmer and he handles the actual flaming for several of his propane farm customers, operating the flamer himself on the customers' farm. Most of the time, K&R is a three-person operation, including Riffel, his wife, and one bobtail driver, and they sell propane to about 800 residential customers and some grain dryers. He added that this year will not be strong in grain drying because "the crop dried pretty good in the field." The business runs three bobtails, two full-time and one as a backup.

"We're trying to increase the agriculture end to help offset the slow time in the summer months." Riffel pointed out that during the flaming season it can take a bobtail load of propane each day that he is flaming. He caters to conventional and organic farmers. "All they can do with that farm ground around the resevoirs is rotary mow. They can't spray or plow it, because the chemical and topsoil runoff would damage the water. I am able to go in and flame for weed control."

Riffel's farming customers see the value of propane flaming and that recognition has expanded through various sectors of the U.S. farming industry. Big Yield (Garden City, Mo.) sells products such as micronutrients to improve soil health, which help enhance farmers' crop yields. It also conducts research to make sure those prod-



The objective of row crop flaming is not to “burn the weeds to a crisp” but to expose the weed to enough heat to vaporize the water in the plant cells. This will destroy the plant’s ability to move moisture and carry on photosynthesis and in a short time will cause the plant to wither and die. The time that the flame must be in contact with the weed will vary with the type and size, but in most cases 1/10 of a second is enough exposure.

ucts help the farmers improve their yield. “We try to do three things for farmers: save money, make money, and save time,” said Kent Kauffman, research data and technology associate for Big Yield. “Increase their efficiencies, reduce their costs, or increase their bottom line.”

Running a research farm out of Garden City is one way Big Yield works toward those goals. “We’re working with organic farmers on how to increase yield, and that’s where we stumbled upon the flaming systems,” Kauffman explained, adding that his organization’s flaming research started by testing Flame Engineering’s Red Dragon row crop flamer.

“We tested it here on the farm and got good results with weed control in corn and soybeans and even got a lot better insect control with the flammers than we did spraying,” Kauffman noted, adding that his firm sprayed insecticides on its conventional crops and ran the burner on its organic crops. “We actually had less insect damage to the crops that we ran the flamer on, because all that heat smokes the insects just as much as it kills the weeds. So that was really nice.”

He noted that the four-row crop burner with a 250-gal. propane tank uses about five to six gallons of propane per acre. Big Yield also tested the 30-ft vegetable bed burner.

“The row crop burner has angle torches designed for when you have crops in the field,” he explained. “The vegetable bed burner is just designed to burn everything. It’s running hotter torches and burns everything it goes over instead of spraying chemicals. In the fall and pre-plant, you just run over it with that and you’re killing all your weeds, any grasses, and things like that after you harvest.” The vegetable bed burner consumes about 11 gallons of

propane an acre, which Kauffman said is “pretty reasonable [in price] compared to conventional sprays.”

Because the propane flammers worked so well, Big Yield became a dealer for Flame Engineering products, selling to organic farmers. Farmers like that they can run the propane burners day or night and also in the rain and in windy conditions, which is not as feasible with conventional sprayers.

“You don’t have to worry about doing anything to your water supply,” Kauffman said. “You can get out in the field two to three times as much as you could with a conventional sprayer, and you’re not spraying the chemicals.”

—Daryl Lubinsky



A portable (“Port-A-Pack”) 18,000-gal. trailer is connected to two vaporizers for a mint processing plant. “The boilers and mint dryers use so many Btus that it requires the vaporizers to help vaporize the liquid propane to supply the high demand,” said Darcy Start of All American Propane.