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## Fruit Brandy Production Research

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In 1996 changes to Michigan legislation reduced the cost of obtaining a license for brandy production for Michigan wineries. This change prompted a number of wineries to explore entry into distilled beverage production. Michigan has seen a surge in wineries adding distilleries, increasing from zero in 1996 to seven in 2000. The production process for these fruit spirits follows the traditional German style, which is fermentation of a whole fruit mash followed by distillation in a specially design column still. The use of the whole fruit in the production process increases the number of flavor components present in the distillate making a more distinctive product.

The process of making fruit brandies involves mashing and fermentation of the whole fruit. It can take as much as thirty pounds of fruit for a liter of final product. The fermented fruit mash is then distilled in a copper batch column still. The 150 L still on campus was manufactured in Germany, and is similar to the stills found on many German farms. The distillation process produces a high proof, water clear distillate. The distillate is fractionated in three cuts. The first cut is the heads cut, which contains higher concentration of low boiling point components, (acetaldehyde, acetone, methanol, esters) and is unfit for consumption. The middle fraction is called the hearts cut. This portion of the distillate has lower concentrations of all the undesired compounds, and eventually becomes the potable product. Finally, the tails cut has an unpleasant aroma character, due to the higher concentration of fusel alcohols and other compounds with boiling points higher than ethanol. The distiller must take care in determining where to make these cuts in the distillate. Attempting to maximize the yield of the hearts cut while producing a quality spirit is the goal of all distillers. The most useful tool to the distiller in determining where to make these cuts is their sense of smell and taste. Sensory overload is common to distillers, especially when running multiple distillations in one day, or when they suffer from a cold.



[click here for larger view](#)

*Picture 1. Christian-Carl 150 L batch still, manufactured in Germany. Michigan fruit spirits are produced in this type of still, which is similar to those found throughout Europe for production of fruit brandies.*

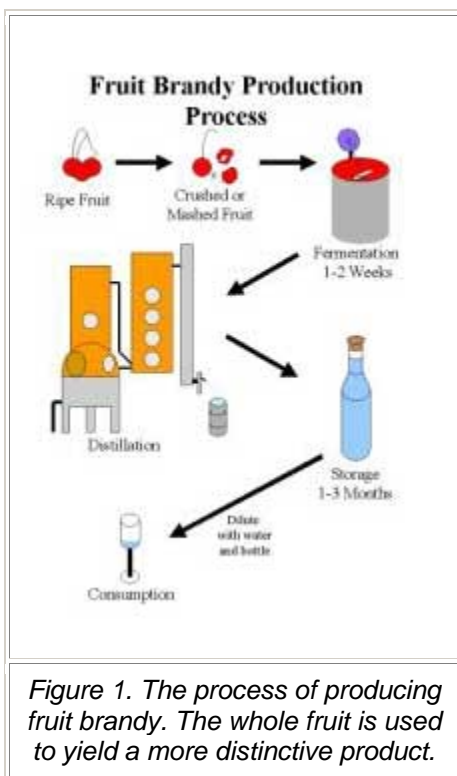


Figure 1. The process of producing fruit brandy. The whole fruit is used to yield a more distinctive product.

Our research is directed at finding methods to aide the distiller in determining where to make the fraction cuts of their distillate, so that they can maximize the amount of quality spirits they produce. Using a small bench-top distillation apparatus, common in any organic chemistry lab, and a gas chromatograph the distiller can determine the approximate concentrations of the congener components present in the fermentation mash. This data can then be entered as the feed stream in a distillation simulation program. This simulation program can then be used to predict where the distiller should make the cuts, based upon the efficiency of the still being used. Michigan wineries can use this procedure to improve their fruit brandies, allowing them to compete with fruit spirits manufacturers on a global level.

