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News from the University of Vermont Proctor Maple Research Center

Check-valve spouts vs. standard clear spouts

A multiyear comparison of yield in 5/16" tubing

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Leader Evaporator Co. Check-Valve (CV) spouts and adapters incorporate a small, free-floating ball which is designed to reduce or prevent backflow of sap into the taphole during freezing, when leaks in the tubing system occurs, and when mechanical releasers dump and introduce air into the system. Several studies over nearly a decade have compared sap yields from CV adapters and spouts to various non-CV spouts and adapters.

In general, research has demonstrated that CV spouts and adapters, when employed in 5/16" vacuum tubing systems, provide additional sap yield throughout the second half of the season, and typically result in net profits exceeding the cost of using them. The amount of improvement in yield and profit is dependent upon a host of factors, including: age of the tubing system, tubing cleaning strategy used, vacuum level, type of releaser, and vacuum management strategies employed. Due to the large differences in conditions they are used in, the increase in sap gain from CV spouts and adapters can vary considerably, ranging from a moderate to a sizeable gain in sap yield and net profit.

As part of a larger study examining spout color (reported in a previous Maple News article, "Does Color Matter?", June/July 2018), we compared sap yield from CV spouts (CV2, Figure 1.) against standard (non-CV) clear spouts from 2014-2017.

To assess the effect of spout type on sap yield, a multi-year study was conducted at the University of Vermont Proctor Maple Research Center in Underhill, Vermont. Six treatment plots were randomly assigned to either Leader CV2 spouts or a standard non-CV, clear spout. There were an average of nearly 87 trees per plot (mainline) and a total of 560 trees in the study overall. All lateral and droplines were 5/16". All droplines were new in 2014. Taphole depth was standardized at 1.5" across all treatments, except for the 2016 season, when 2.0" tapholes were drilled. Taphole aspect was not controlled, but given the relatively large numbers of trees in each treatment, it can be safely assumed that there was no difference in tapping direction between treatments.

All mainlines were on a common vacuum system that typically operated at 25-27" Hg over each season. Releasers were custom-designed, mechanical Lapierre units which were electrically triggered with a float, with one releaser serving one treatment mainline. Releasers were equipped with a counter to record the number of dumps. Daily releaser counts were recorded for each flow day throughout each season and multiplied by the calibrated amount of sap released per dump. The result was then divided by the number of taps per line to arrive at an average sap yield for each spout type over the season.

The study was conducted over four seasons from 2014-

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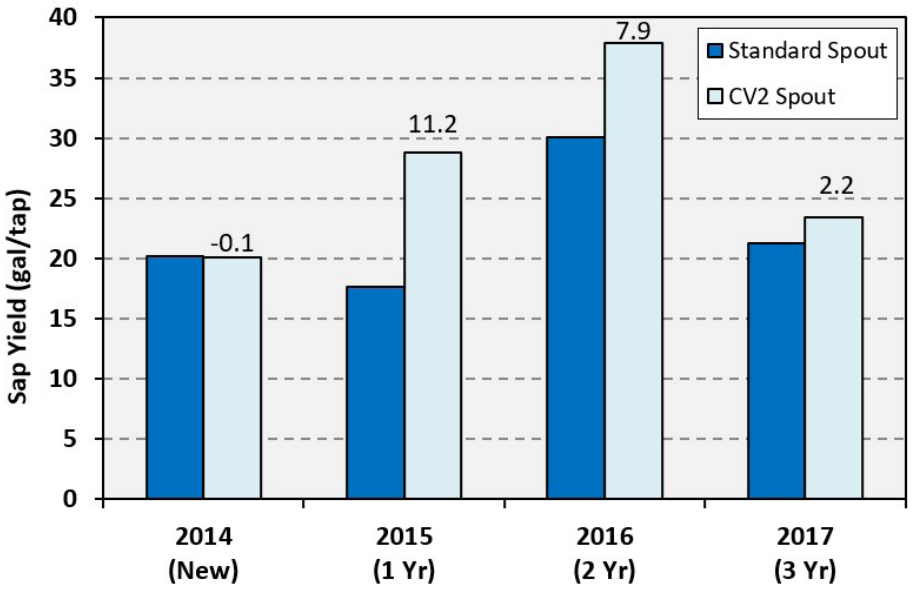

2017. Both standard spouts and CV spouts were replaced for each treatment each year, and lines were "dry-cleaned" (spouts pulled with the vacuum on) at the end of each production season.

For the first year, when droplines were new, there was only a very small, non-significant difference in sap yield by treatment (Figure 2). This is the expected result, since new droplines have very low levels of microbial contamination, thus very little for the CV spouts to protect against. For each of the three succeeding seasons (2015, 2016, and 2017), the CV spouts produced significantly more sap than non-CV spouts, averaging 11.2, 7.9, and 2.2 gal/tap in the three years respectively.

The overall average increase in sap yield for the period 2015-2017 as a result of using CV spouts compared to non-CV spouts was 7.1 gal/tap annually, for an average 33.3% increase, producing an average additional net profit of approximately $3.02/tap each year for the three-year period (assuming a sap value of $0.50/gal).

It is not clear why the yield from CV spouts was only 10.4% higher compared to non-CV spouts in 2017, however the season overall in Underhill, VT, was cold and long, but stopped fairly abruptly. While the length of the season argues for a bigger increase (longer seasons typically produce larger sanitation-related effects), this trend may have been negated by the low temperatures throughout the spring sap flow period. This notion is supported by the fact that standard black spouts outperformed standard clear or white spouts in 2017.

Regardless, the overall 33.3% average increase in sap yield over the three-year period (2014-2017) is consistent with previous research demonstrating the value of using CV spouts or adapters in 5/16" maple tubing systems once droplines have been used more than one season.

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