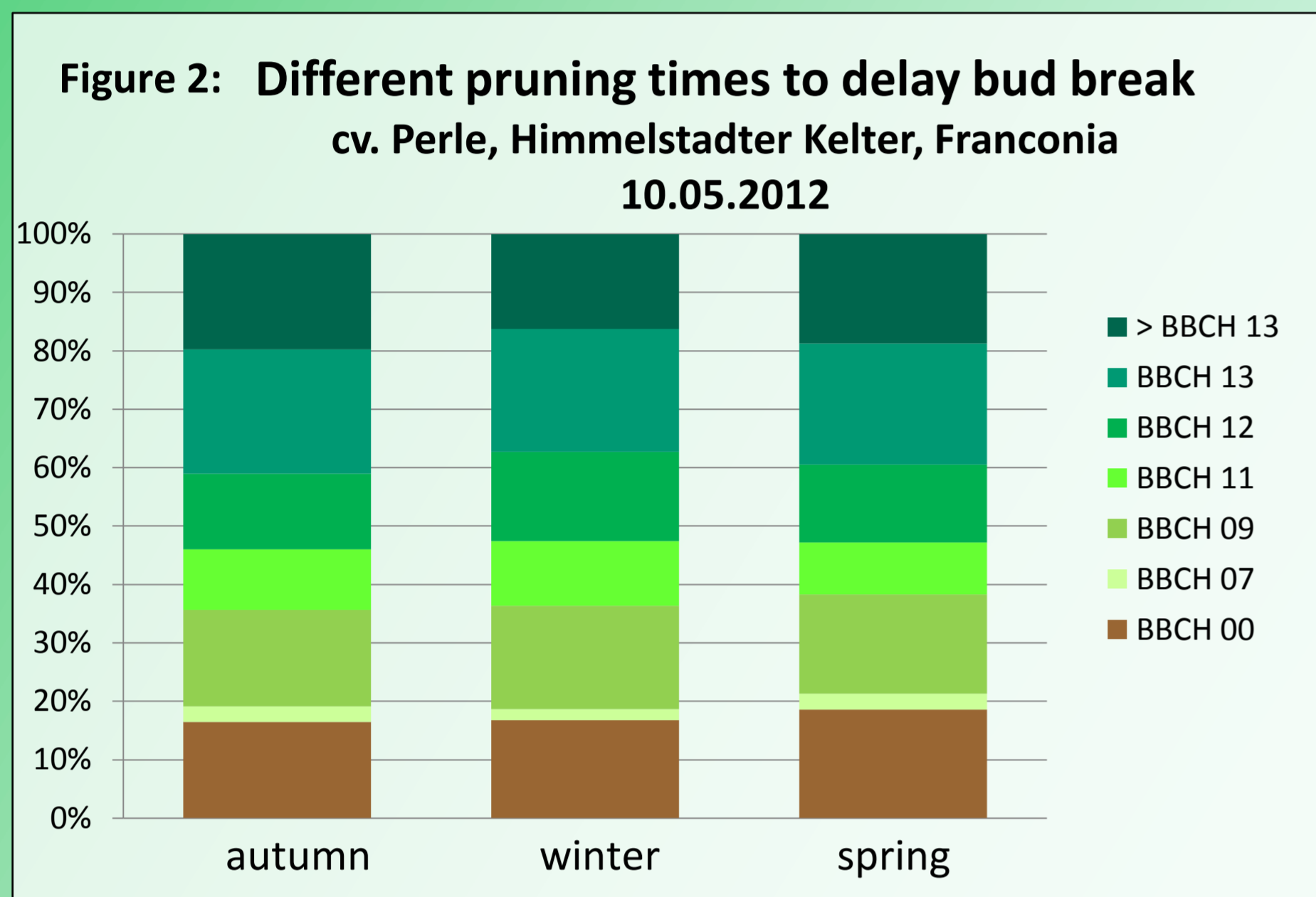
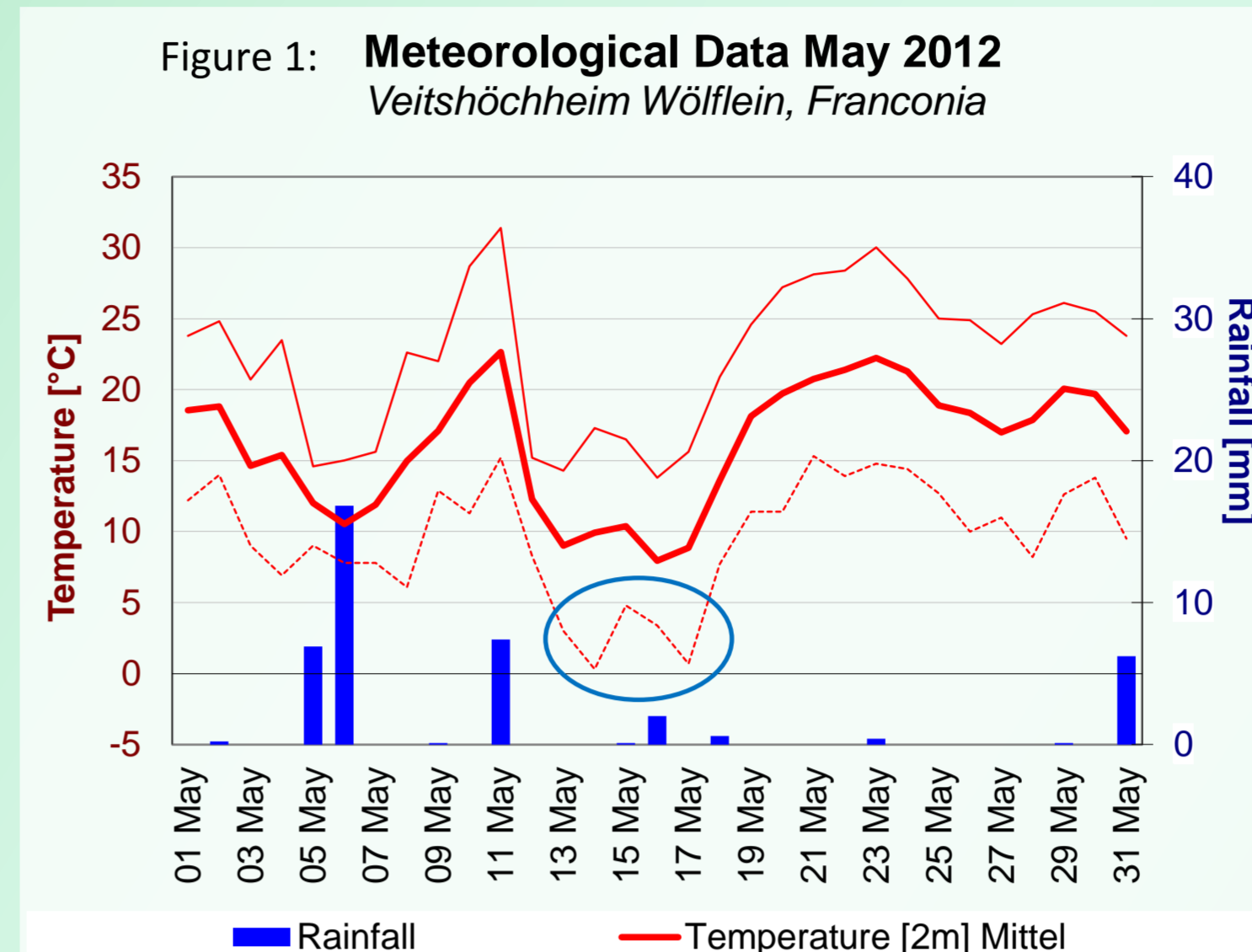


Spring Frost Protection in Viticulture

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Due to damages following the spring frost in 2011 the Bavarian Institute of Viticulture and Horticulture started a research project to adopt existing methods to prevent spring frost damage and develop new ones.

Franconian Vineyards used to suffer of spring freeze during the first half of may (so called „ice-saints“ between May, 11th and 15th, see fig. 1). Due to climate change the plant growth is accelerated and leads to earlier bud break. Despite warmer mean temperatures the risk of frost events is increasing as the period of late frost occurrence is not changing.



Spring frost damage can be prevented by classical methods like

- selection of suitable sites, that are not exposed to spring frost
- late pruning of the vineyards (figure 2)
- increasing the number of nodes left for bud break (e.g. frost spur, minimal pruning)
- mulching or spraying herbicides before the critical period will help to increase the temperature within the vines.

Active prevention methods are:

- heating the vines with warm air fans, ovens or heating wires (Fig. 3 to 6)
- mixing cold air near the soil with warmer layers above by using helicopters, wind machines or cold air drain units (SIS) (Fig. 7 to 9)
- fogging the vines: artificial fog prevents emission of warm air out of the soil and immission of cold air from above
- frost irrigation: when water is evaporating the released energy will lead to a temperature increase (Figure 10)
- applying frost prevention products directly on vines: this can increase the frost hardiness of plants by delaying bud break (Fig. 11)

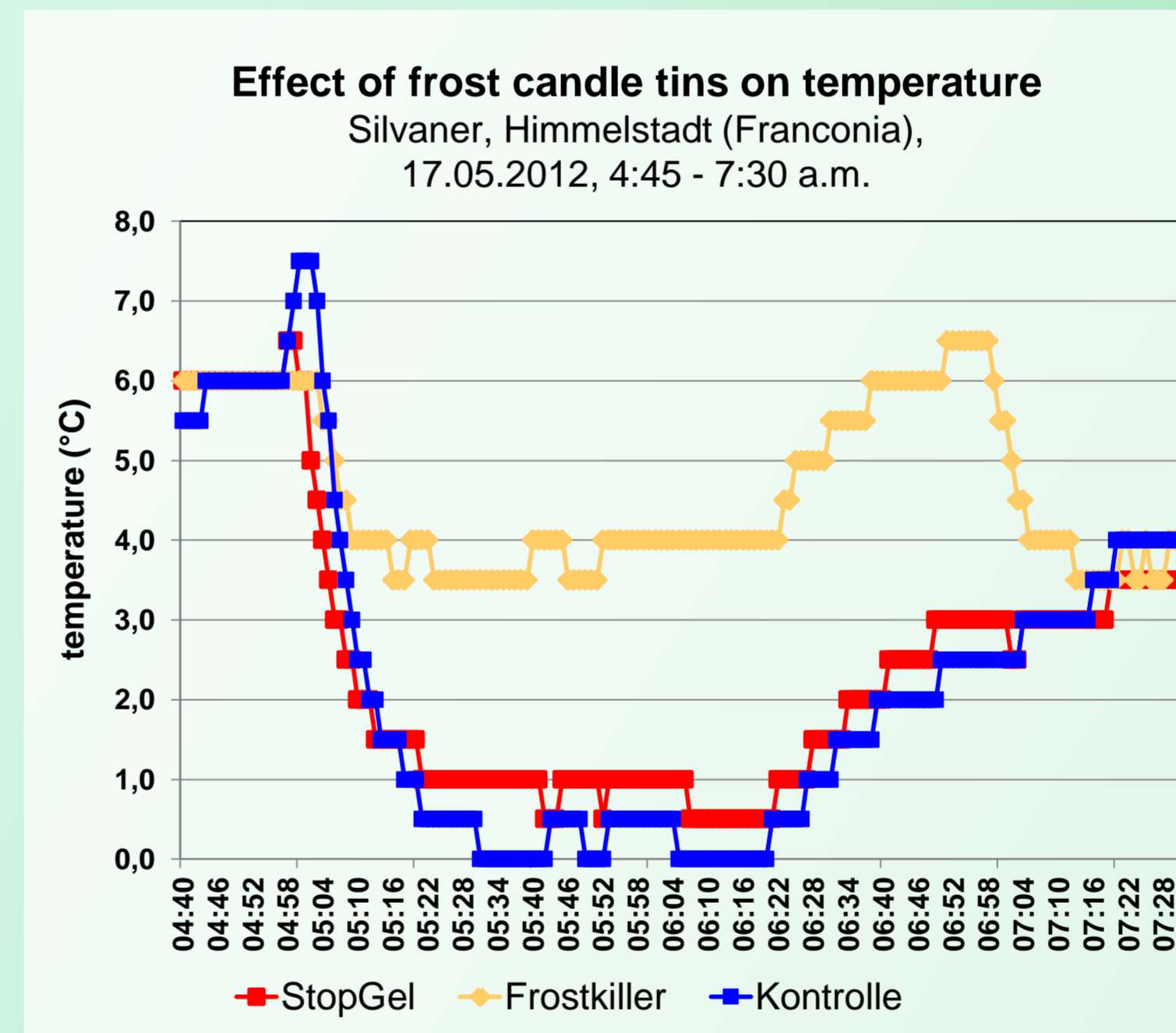


Fig. 4: Frostbuster for heating



Fig. 5: Frost candle tins



Fig. 6: Heating wires



Fig. 7: Helicopter in a vineyard near Sommerach (12.05.2012)



Fig. 8: Portable wind machine

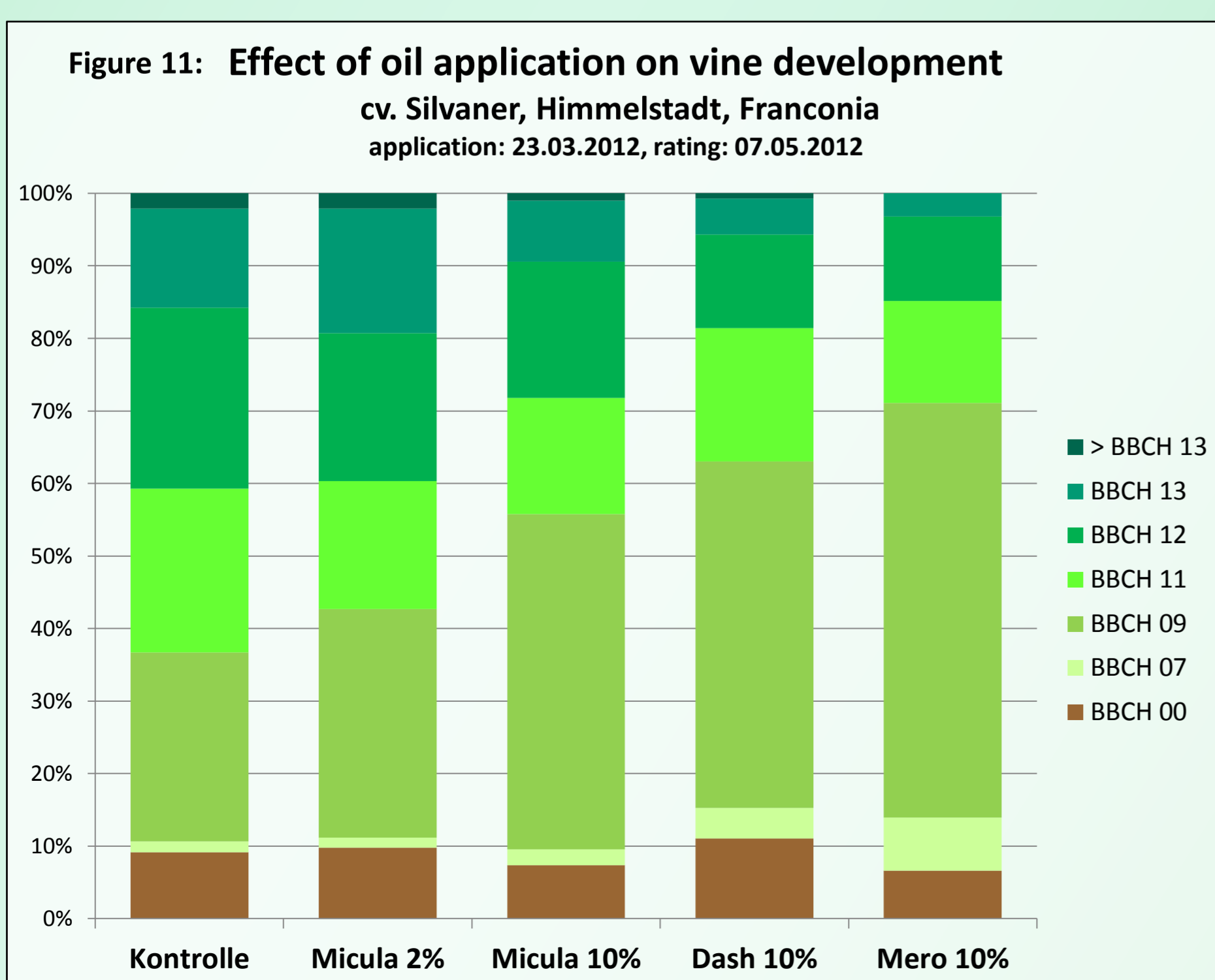


Fig. 9: Cold-Air-Drain Unit (SIS)

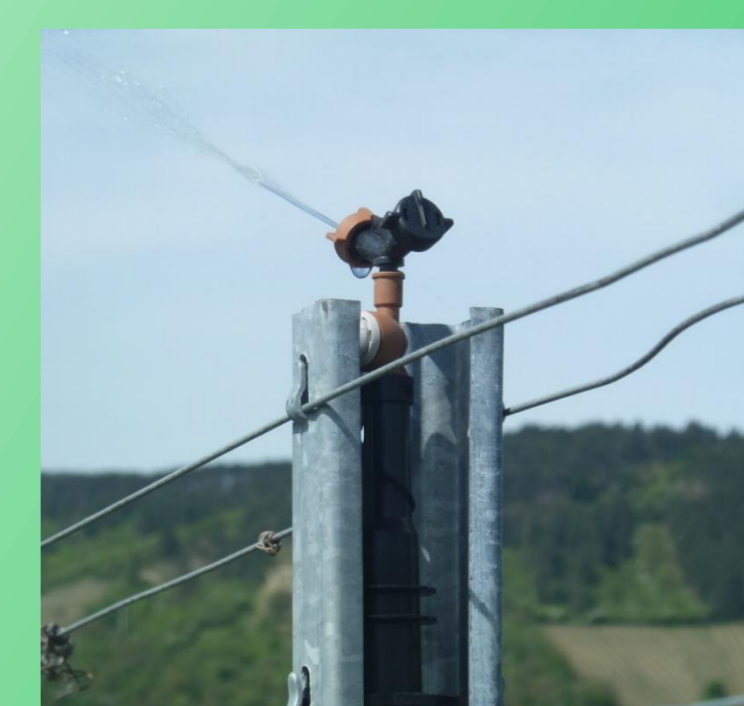


Fig. 10: sprinkler for frost irrigation

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