Cap Management in Melomel (Fruit Meads):

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What is a “Cap?”

The Cap is the layer of fruit that floats up and his held at the top of the fermentation vessel by CO_2 during fermentation of a melomel with fruit in the primary. This term comes from the conical shape of the heaped up pomace (in grape winemaking) emerging from the open tanks, which is collected together after having been *piagé*, that is to say trampled with the feet. (Peynaud 1981)

Cap management:

Managing the fruit cap during early fermentation is especially important as there are key factors discussed below that contribute to the "loss" or "burn off" of fruit flavor, yeast stress, stuck fermentation, off flavors/characters, and failure to maximize the fruit character during primary when using fruit (whether fresh, frozen, dried, etc.) if the cap is not broken up regularly throughout the course of the primary fermentation.

Heat, Sugar and Yeast:

For every 1 degree of brix reduction by fermentation of your must there is a 2.3° F increase in temperature. The temperature can build up very quickly and kill off the yeast living in the "heat zone" below the cap when the temperature rises above 104-106° F. You'll literally cook off a lot of the floral, fruity characters from the berries/fruit you're using. You'll also lose a good percentage of your yeast and have a stuck fermentation to boot.

Along with that you'll have off flavors from the yeast being stressed out before they kick off. Finally by mixing the berries back down into the must you facilitate extraction of color, tannin, aroma, flavor and fruity character hence the final mead will present with more of the flavor of the fruit.

It is also necessary to punch down frequently to redistribute the yeast (the highest concentration of yeast are found in and directly below the cap) throughout the fermentation vessel in order to promote a more uniform fermentation.

This is especially important when one realizes that as the yeast population differs in various portions of the tank, the reduction of sugar through fermentation will be uneven if the cap is not punched down and mixed back into the must. Thus it is critical that the cap be managed effectively in order to homogenize the yeast, sugar and temperature distribution within the fermentation vessel.

CO_2:

If the cap is not broken up or "punched down" the CO_2 buildup under the cap will deprive your yeast of oxygen. Oxygen is required by the yeast for optimal ethanol tolerance. This is why we aerate during the first third of fermentation in order to get O2 into the must for the yeast which enables the synthesis of sterols in order to strengthen the cell walls. One may think of O2 as a rudimentary yeast nutrient during early fermentation for the benefit of the cell walls. Healthy cell walls are needed to:

- Provide resistance to the rapidly rising level of alcohol
- Regulate osmotic pressure across the cell wall
- Effectively transport nitrogen into the cell
- Help regulate pH within the cytoplasm
- Ensure that the yeast cells are able to reproduce efficiently and proceed unstressed throughout the fermentation

Again, if the yeast is not performing to it's spec based on improper cap management or nutrient poor must, the fermentation be become stuck, or just drag on forever.

Drying:

If the cap isn't pressed down into the must frequently (this depends on how much fruit you use, along with the type of fruit, i.e. purees will take less punching down than crushed fresh, frozen or rehydrated dried fruit) to keep it moist the top will dry and spoilage organisms can set in which then compete with your yeast producing off flavors, or worse completely spoiling your mead. Again, if the yeast is compromised into a position of fighting for dominance in the must, they will not be doing their primary job of a fast, clean ferment.

Early exposure to oxygen for both the yeast and the fruit during primary is very important in the formation of the overall fruit flavor and character. Sinking the fruit in a grain bag is also practiced widely and yields very good results. Bear in mind that for very large fruit additions (3-4 lbs of fruit/gallon of must) using a grain bag may be impractical and the use of a plastic bucket provides easier management and access to the fermenting must and fruit.