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Effect of Peppermint Maturity, Height, Biomass, and Time of Harvest on Oil Yield and Oil Quality in the Lower Klamath Basin

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Objective: Determine if plant maturity, height, biomass, and/or time of harvest can be used to estimate oil yield and oil quality to assist growers in harvest planning.

Procedures: In 2009, eight locations were sampled on a weekly basis starting July 14th. Samples were harvested from two randomly placed 5ft x 10ft quadrats in growers' peppermint fields. With each successive harvest, quadrats were placed 2 ft from the previous week's samples in the same field location. Mint in each quadrat was cut with a sickle bar mower, raked, put into garbage cans, and weighed. Samples were air-dried on burlap tarps in a windrow for two days before distillation. After drying, samples were chopped with a straw chopper, weighed, and then packed into distillation pots. Quadrat samples were distilled for 30 minutes with temperatures between 110^0-115^0F in the teepee, 120^0F in the condenser, and an average of 1lb psi in the distillation pots. Mint oil from each quadrat was sampled for quality tests which were run at the I.P. Callison lab in Lacey Washington.

Mint Oil Yield Results: Mint oil yield showed little correlation to canopy height, stem length, and plot biomass. Date of harvest and mint maturity appear to be the best indicators for estimating mint yield and quality (Figures 1, 2, 5, 6, & 8). With regard to plant maturity, mint oil yield was highest when mint was harvested when plants reached 10% to 50% bloom (Figures 5 & 8). This stage of plant maturity occurred during the 2nd and 3rd week of August in 2007, 2008, and 2009 (Figures 1, 2, & 6).

Mint Oil Quality Results: Mint oil quality is relatively subjective depending on the buyers' preferences. With this in mind, some quality measurements are desirable by most buyers. In general, menthofuran should be less than 3% or greater than 5%. Pulegone should be less than 2%. Flavor notes should be clean with no problems. In 2009, all samples had Pulegone levels below 2. Similar to yield, date of harvest and mint maturity (Figure 4) were the best indicators for oil menthofuran. Menthofuran was below 3% when mint was harvested before the 3rd week of August (Figure 3 and 7). Mint with less than 50% bloom had menthofuran levels below 3% (Figure 9). Interestingly, mint harvested during the 2nd and 3rd week of August and between 10% to 50% bloom tended to have clean flavor notes. Mint harvested before these dates and maturity often had sweet flavor notes, and mint harvested after these dates and maturity had over-mature flavor notes.

Conclusions: Mint oil yield and quality were maximized when mint is harvested between 10% to 50% bloom. This maturity time occurred around the 2nd week of August at most locations in 2009 and at IREC averaged over a 3-year period.

Figure 1. Oil Yield (lbs/acre) at 6 Harvest Times in 2009
(data averaged across 4 sites)

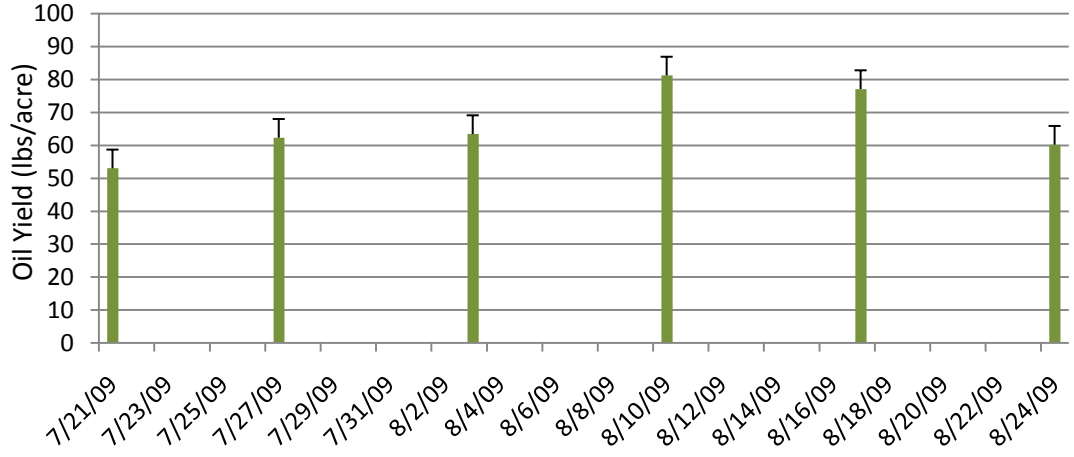


Figure 2. Mint Maturity/% Bloom at 6 Harvest Times in 2009
(data averaged across 4 sites)

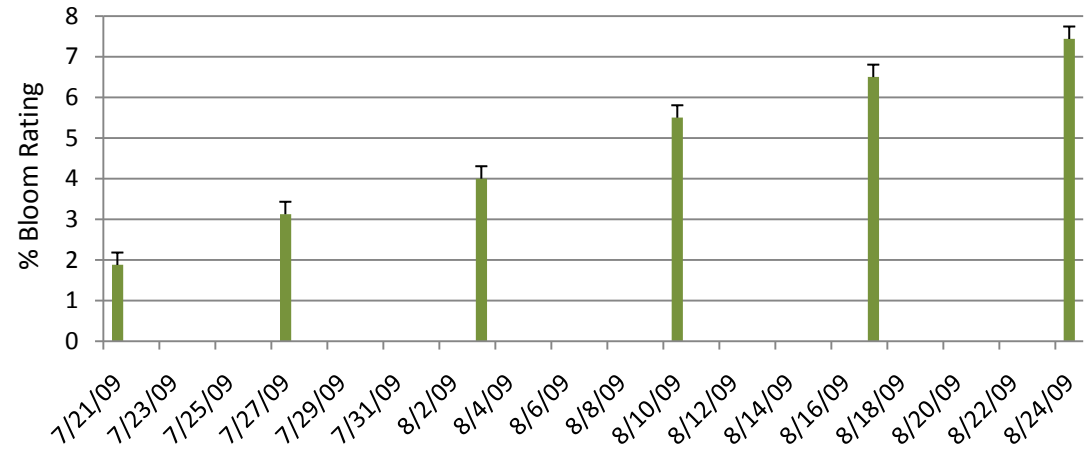
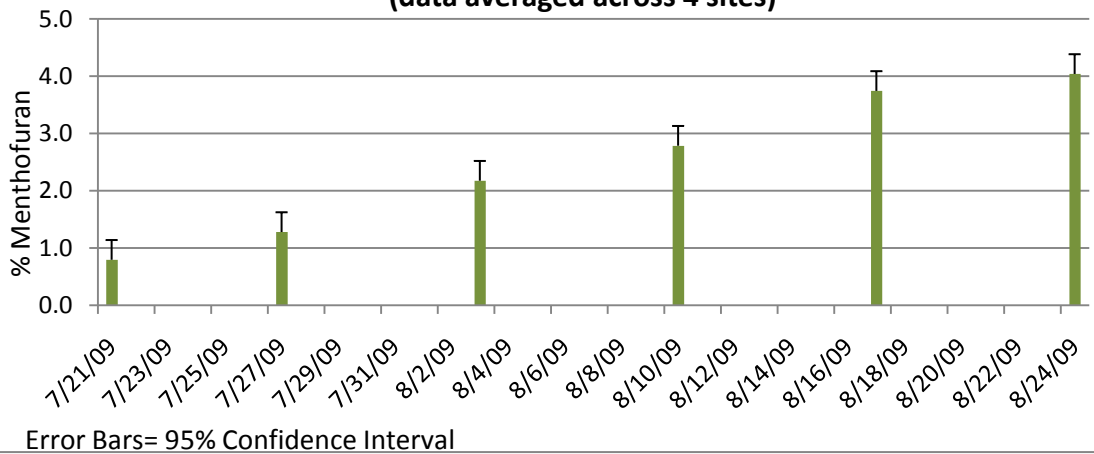


Figure 3. Menthofuran Oil Quality % at 6 Harvest Times in 2009
(data averaged across 4 sites)



Error Bars= 95% Confidence Interval

% Bloom Rating Scale	
1= Visible Terminal Buds	5= 1-15% Bloom
2= 10-30% Terminal Buds	6= 16-50% Bloom
3= 30-60% Terminal Buds	7= 51-85% Bloom
4= Multiple Elongated Buds, >1% bloom	8= 86-100% Bloom

Figure 4. Mint Maturity/% Bloom vs % Menthofuran Oil Quality at 6 Harvest Times in 2009 (data averaged across 4 sites)

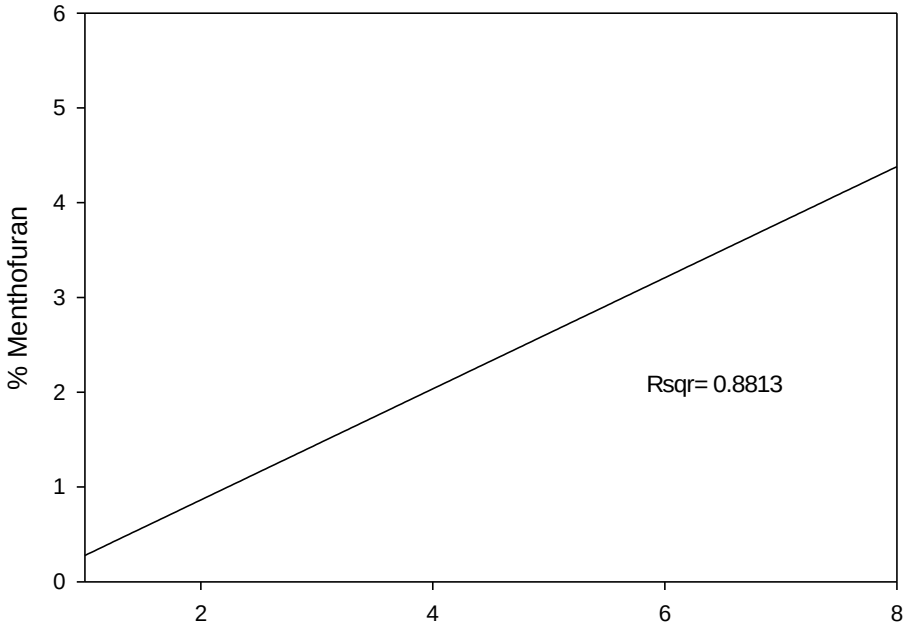


Figure 5. Mint Maturity/% Bloom vs Oil Yield (lbs/acre) at 6 Harvest Times in 2009 (data averaged across 4 sites)

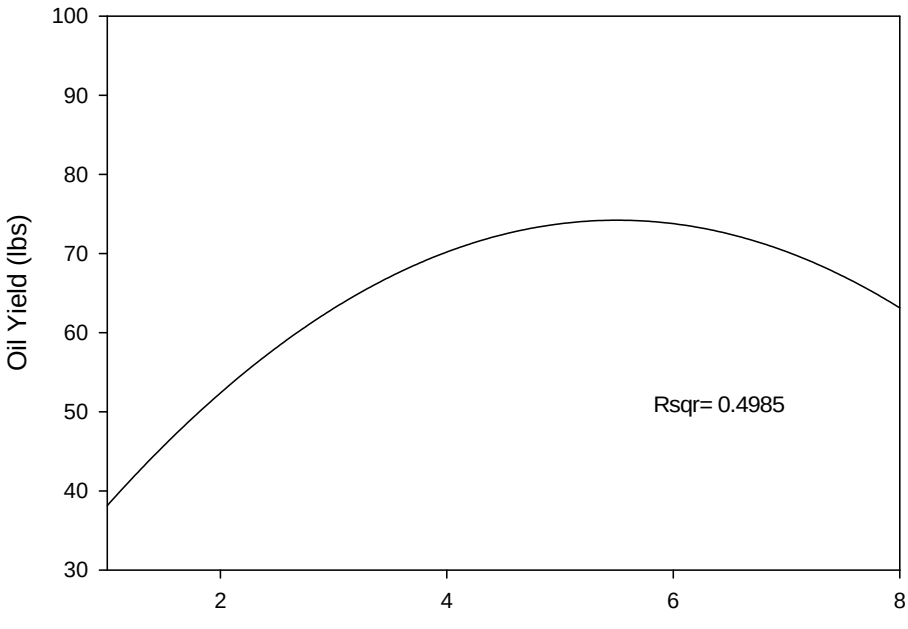


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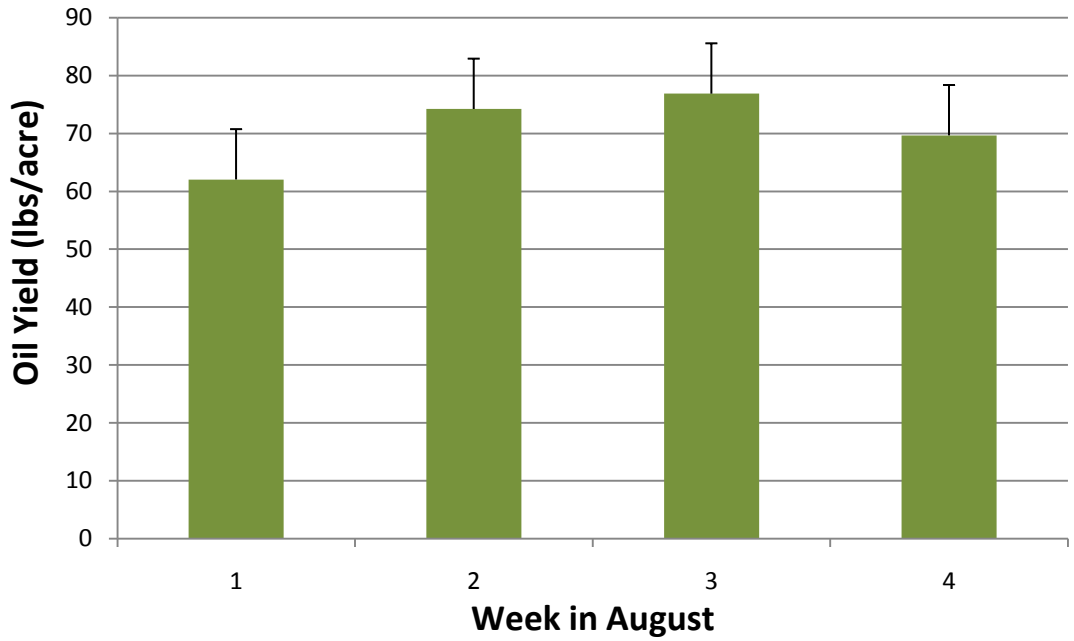
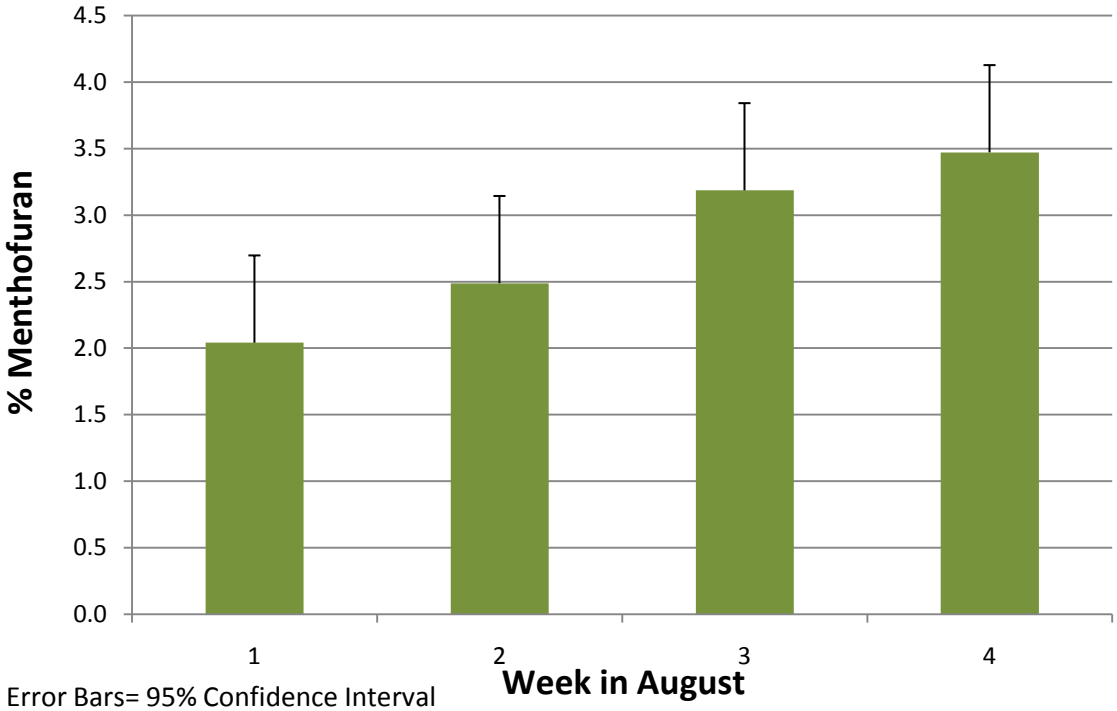
Figure 6. Three Year Comparison of Oil Yield (lbs/acre) (averaged over multiple sites)



Error Bars= 95% Confidence Interval

Figure 7. Three Year Comparison of %Menthofuran (averaged over mulitple sites)



Error Bars= 95% Confidence Interval

Figure 8. Three Year Comparison of
Mint Maturity/% Bloom vs Oil Yield (lbs/acre)
(averaged over multiple sites)

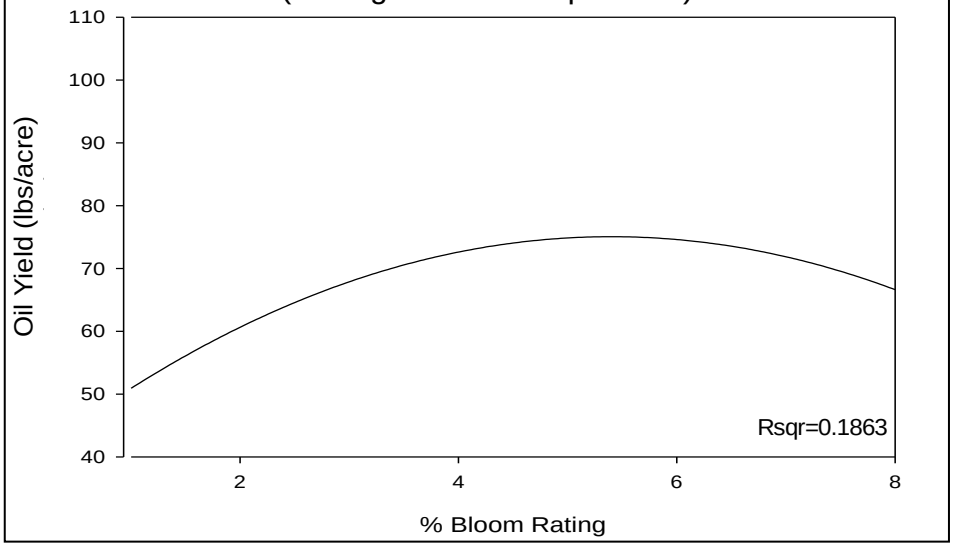
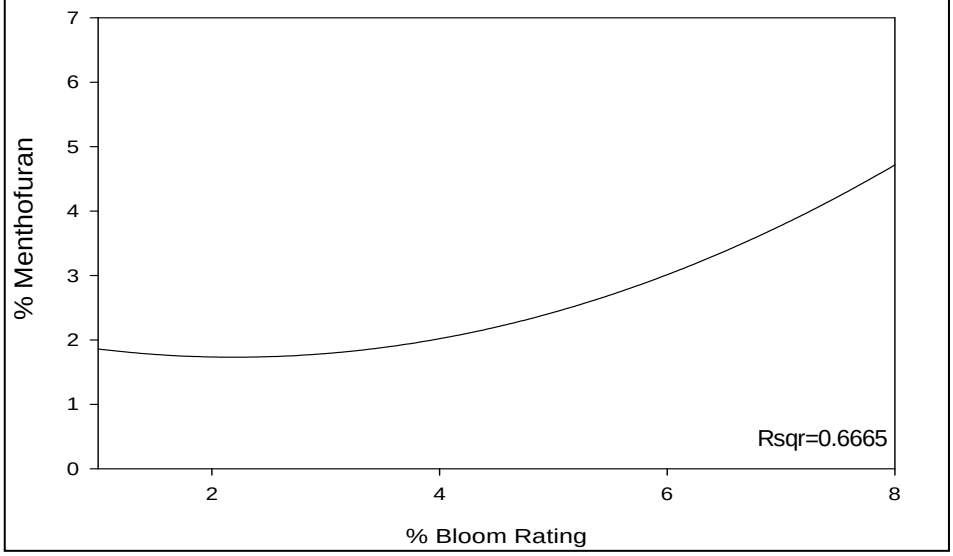


Figure 9. Three Year Comparison of
Mint Maturity/% Bloom vs. % Menthofuran Oil Quality
(averaged over multiple sites)



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