

EXST7015

Daily Design 25

Carefully read the description of this experiment. Be prepared to answer the questions that follow the design as described (the experiment is modified from the original) as a class quiz.

Increase herb consumption in United States has grown significantly and oregano is the most important in terms of both quantity and in dollar value. Thymol and carvacrol are the two major compounds in the essential oil obtained from Mexican oregano and are of special interest due to their antioxidant and antimicrobial properties. This study examines the effect of moisture and growth stage on the thymol and carvacrol composition of Mexican oregano.

The greenhouse experiment was conducted (ambient temperature at 22-24°C and a photoperiod of 16 h daylight and 8 h night) on seedlings that were started in perforated plastic tubes (5 oregano seeds/tube) and transplanted at two-months old to individual plastic pots (1 plant/pot) filled with a commercial peat mixture. There were 4 watering schemes (0.2, 0.4, 0.8 and 1.2 L water/pot/15 days) and 3 growth phases (seedling = 30 days after transplant (S), full bloom = 60 days after transplant (F) and maturity = 90 days after transplant (M)). Five replicate pots were done for each of the 12 combinations of watering and growth phase. Each replicate consisted of one plant per pot whose leaves were harvested, dried at room temperature, had the essential oil extracted using a laboratory scale steam distillation unit and analyzed by gas chromatography. All extraction runs and analyses were carried out in duplicate and in randomized order with the **mean values being reported with one value for each plant**. Several variables were measured, but we will use only carvacrol % concentration as our variable of interest.

Table 2. Effect of moisture and plant growth on the thymol and carvacrol concentration (% w/w) and oil content (% w/w) of Mexican oregano

Treatment ¹	Oil Amount	Thymol	Carvacrol
S0.2	2.3 ^{a,b,c}	43.4 ^{a,b}	25.0 ^b
S0.4	2.5 ^a	37.1 ^{a,b}	25.5 ^b
S0.8	2.0 ^{a,b,c,d}	46.7 ^{a,b}	24.5 ^b
S1.2	2.4 ^{a,b}	40.2 ^{a,b}	21.1 ^b
F0.2	1.5 ^{b,c,d,e}	27.8 ^{a,b}	50.0 ^a
F0.4	1.9 ^{a,b,c,d}	38.1 ^{a,b}	24.6 ^b
F0.8	1.8 ^{a,b,c,d}	38.1 ^{a,b}	29.0 ^{a,b}
F1.2	1.8 ^{a,b,c,d}	53.9 ^a	29.9 ^{a,b}
M0.2	2.3 ^{a,b,c}	22.7 ^b	29.0 ^{a,b}
M0.4	1.2 ^{d,e}	45.5 ^{a,b}	31.9 ^{a,b}
M0.8	0.7 ^e	40.9 ^{a,b}	19.1 ^b
M1.2	1.5 ^{d,e,c}	43.2 ^{a,b}	15.7 ^b

Means in the same column with the same alphabet are not significantly different at $P=0.05$. ¹Please see Table 1 for the explanation of treatment labels.

Answer choices:	(A) replicates	(B) plant or pot	(C) carvacrol concentration
	(D) watering schemes	(E) growth phases	(F) commercial peat mixture

Name _____ Quiz Number ____ Date ____ / ____ / 2012

Circle the appropriate letter for each question.

- 1) What is the experimental unit for this experiment? A B C D E F
- 2) What is the sampling unit for this experiment? A B C D E F
- 3) What is the dependent variable for this experiment? A B C D E F
- 4) What is the treatment variable for this experiment? A B C D E F
- 5) If the design is RBD, what are the blocks? A B C D E F NA
- 6) Does it seem more likely that the treatments are fixed or random? (A) fixed (B) random
- 7) What is the treatment arrangement for this experiment? (A) single factor (B) factorial (C) nested
- 8) What is the experimental design? (A) CRD (B) RBD (C) LSD (D) Split-plot (E) Repeated Measures
- 9) The treatment degrees of freedom are _____.
- 10) The degrees of freedom for the error used for testing treatments are _____.