**EMF and electromagnetic radiation parameter decision.**

**(based on Taguchi Analysis.)**

Abstact*: Electromotive force generates electromagnetic radiation. It is therefore necessary to study the mathematical equations related to electromotive force. This paper focuses on electromagnetic radiation generated due to electromotive force . Depending upon the mathematical equations governing emf, certain parameters affecting electromagnetic radiation are decided based on Taguchi Analysis. Taguchi analysis is carried out for only those factors which affect and cause more electromagnetic radiation. Accordingly after carrying out Taguchi analysis , a condition is finalized so that it causes least electromagnetic radiation. This condition is optimum condition which can be applied in any situation . It can also take care of human health as more electromagnetic radiation is harmful to human health.*

1. Introduction

In 1831, Faraday proved that current can be produced by magnetism. He wound two separate windings on an iron toroid and placed a galvanometer in one circuit and a battery in the other. Upon closing the battery circuit , he noted a momentary deflection of the galvanometer, a similar deflection in the opposite direction occurred when the battery was disconnected. This of course was the first experiment he had made involving a changing magnetic field, and he followed it with a demonstration that either a moving magnetic field or a moving coil could also produce galvanometer deflection.

In terms of fields, we can say that a time varying magnetic field produces an electromotive force (emf) which may establish a current in a suitable closed circuit.

An electromotive force is merely a voltage that arises from conductors moving in a magnetic field or from changing magnetic fields. Faraday’s law is stated as

Emf= -dФ/dt V.-------(1)

Above equation implies a closed path, although not necessarily a closed conducting path. The magnetic flux is that flux which passes through any and every surface whose perimeter is the closed path, and dФ/dt is the time rate of change of this flux.

A non zero value of dФ/dt may result from any of the following situations:

1. A time – changing flux linking a stationary closed path
2. Relative motion between a steady flux and a closed path.
3. A combination of the two.

The minus sign is an indication that the emf is in such a direction as to produce a current whose flux , if added to the original flux , would reduce the magnitude of the emf. This statement that the induced voltage acts to produce an opposing flux is known as Lenz’s law.

Emf is also expressed as

Emf = ∫ E.dL--------(2)

Note that it is the voltage about a specific closed path. If any part of the path is changed, the emf in general changes.

Emf is also denoted as

Emf= ∫ E.dL = -d/dt ∫sB.dS ---------(3)

The fingers of our right hand indicate the direction of closed path and our thumb indicates the direction of dS. A flux density B in the direction of dS and increasing with time thus produces an average value of E which is opposite to the positive direction about the closed path.

We first consider a stationary path. The magnetic flux is the only time varying quantity on the right side of (3) , and a partial derivative may be taken under the integral sign ,

Emf= ∫ E.dL = -∫s∂B/∂t.dS ---------(4)

Applying Stoke’s theorem to the closed line integral , we have

∫s(∆xE).dS= -∫s∂B/∂t.dS

Where the surface integrals may be taken over identical surfaces. The surfaces are perfectly general and may be chosen as differentials,

(∆xE) .dS= - ∂B/∂t.dS ----------(5)

And

∆xE= - ∂B/∂t -----------(6)

This is one of Maxwell’s four equations as written in differential ,or point form .

Equation 5 is the integral form of this equation and is equivalent to Faraday’s law as applied to a fixed path.If B is not a function of time ,(5) and (6) evidently reduce to the electrostatic equations,

∫E.d L = 0 (Electrostatics)

And

∆xE= 0 (electrostatics)

As an example of the interpretation of (5) and (6) , let us assume a simple magnetic field which increases exponentially with time within the cylindrical region ρ ˂ b,

B= B0ektaz ----------(7)

Where

B0 = constant.

Choosing the circular path ρ=a, a<b in the z=0 plane , along which EФ must be constant by symmetry, we then have from (4)

Emf=2ПaEФ = -kB0ektПa2--------------(8)

If we replace a by ρ, ρ˂ b, the electric field intensity at any point is

E= -1/2 k B0ekt ρ aФ -----------------(9)

1. Modelling of system:

The basic system is radiation measurement system. Depending on the equations governing electromotive force(emf) first the parameters affecting are decided according to priority. Thus following parameters which affect emf the most are decided.

1. Flux density
2. Time
3. Electric field intensity
4. Distance

However more study reveals that electric field intensity and flux density equally are responsible for emf, hence any one can be considered hence we will consider flux density, time and distance as three parameters.

Another important thing is that it is proved that plants/trees reduce emf.

Hence in our system we will measure emf nearby plants/trees.

The system will measure radiation at two different values of time, distance and flux density in an area without plants/ trees, and similarly it will measure radiation at two different values of time, distance and flux density in an area having plants/trees.

The system will also record radiation values at early morning, afternoon and night.

The system will also record radiation values in different climate i.e hot, cold and rainy. also in airy atmosphere radiation values can be measured.

A detailed analysis of all above measurements will be done to reach some definite conclusions. Thereafter an optimum condition can be decided to have less amount of radiation.

1. Results and Discussions:

During experimentation following readings were taken.

Table 1

|  |  |  |  |
| --- | --- | --- | --- |
| parameters | Minimum and max values | Mean value of Radiation measured at minimum values | Mean value of Radiation measured at maximum values |
|  |  |  |  |
|  |  |  |  |
| Rainy atmosphere (at home) | 32 µTesla,35 µTesla | 33.565 µTesla | 23.098 µTesla |
| Rainy atmosphere  (outside home) | 34 µTesla, 36 µTesla | 33.86µTesla | 35 µTesla |
| Without gomutra bottle (at 7 p.m) | 37.94 µTesla,,42.84 µTesla, | 37.94 µTesla, | 42.84 µTesla, |
| With gomutra bottle (at 7 p.m) | 37.5 µTesla,38.2 µTesla, | 37.82 µTesla, | 42.51 µTesla, |
|  | | | | |

Each experiment is repeated 15 times and then mean value of radiation is decided in above tables.

Table 3

|  |  |  |
| --- | --- | --- |
| parameters | Mean value of Radiation measured at minimum values during day time | Mean value of Radiation measured at maximum values during evening. |
| Radiation near plants such as aloe vera and cactus | 33.86 µTesla(for aloe vera)  33.47 µTesla(for cactus) | 38.53 µTesla(for aloe vera)  39.47 µTesla(for cactus) |

Table 4

|  |  |
| --- | --- |
| Direction | Mean value of Radiation |
| EAST | 42.47 µTesla |
| WEST | 40.07 µTesla |
| NORTH | 40.67 µTesla |
| SOUTH | 40.73 µTesla |

The above readings are taken at evening time at 7.15 pm.

Table 5 : readings taken at 7 p.m evening with and without gomutra bottle.

|  |  |  |
| --- | --- | --- |
| Direction | Mean value of Radiation  With gomutra bottle | Mean value of Radiation  Without gomutra bottle |
| EAST | 37.82 µTesla | 37.94 µTesla |
| WEST | 41.66 µTesla | 41.75 µTesla |
| NORTH | 42.51 µTesla | 42.84 µTesla |
| SOUTH | 37.92 µTesla | 38.32 µTesla |

1. Conclusions:

It is a common observation that in evening , emf is highest in east direction ,it is lowest in west , in north and south direction emf is high.

In morning emf is least in east direction and high in west.

The emf is less than the emf outside home near the plants such as aloe- vera and cactus during day time. However it increases than emf outside home near plants such as aloe- vera and cactus. This indicates that during day time such plants absorb radiation and serve to minimise radiation in atmosphere.

Emf is different at different times and in different seasons also it varies. In hot atmosphere emf values are high.

In cold atmosphere emf is low.

EMF decreases due to gomutra bottle as seen by readings in table 5.

Hence gomutra has capacity to decrease radiation.

































From above graph it is clear that all points lie in a balanced way above average value of 0.64.



Pareto Chart of outside by near aloe

Nested ANOVA: near cactus, near cactus1, near aloe, near aloe1

Nested ANOVA: near cactus versus outside

Analysis of Variance for near cactus

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 1.5548 | 0.7774 |
| Error | 12 | 10.1786 | 0.8482 |
| Total | 14 | 11.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | -0.015\* | 0.00 | 0.000 |
| Error | 0.848 | 100.00 | 0.921 |
| Total | 0.848 |  | 0.921 |

\* Value is negative, and is estimated by zero.

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near cactus1 versus outside

Analysis of Variance for near cactus1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.0190 | 1.0095 |
| Error | 12 | 3.7143 | 0.3095 |
| Total | 14 | 5.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.146 | 32.03 | 0.382 |
| Error | 0.310 | 67.97 | 0.556 |
| Total | 0.455 |  | 0.675 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe versus outside

Analysis of Variance for near aloe

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.7548 | 1.3774 |
| Error | 12 | 6.1786 | 0.5149 |
| Total | 14 | 8.9333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.180 | 25.87 | 0.424 |
| Error | 0.515 | 74.13 | 0.718 |
| Total | 0.695 |  | 0.833 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe1 versus outside

Analysis of Variance for near aloe1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 0.5548 | 0.2774 |
| Error | 12 | 3.1786 | 0.2649 |
| Total | 14 | 3.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.003 | 0.97 | 0.051 |
| Error | 0.265 | 99.03 | 0.515 |
| Total | 0.267 |  | 0.517 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

General Linear Model: near cactus versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 1.555 | 0.7774 | 0.92 | 0.426 |
| Error | 12 | 10.179 | 0.8482 |  |  |
| Total | 14 | 11.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.920985 | 13.25% | 0.00% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 33.512 | 0.246 | 136.15 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | 0.488 | 0.362 | 1.35 | 0.203 | 1.24 |
| 35 | -0.226 | 0.318 | -0.71 | 0.490 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus | = | 33.512 + 0.488 outside\_34 - 0.226 outside\_35 - 0.262 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus | Fit | Resid | Std Resid |  |
| 14 | 32.000 | 34.000 | -2.000 | -2.51 | R |

R  Large residual

General Linear Model: near cactus1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.019 | 1.0095 | 3.26 | 0.074 |
| Error | 12 | 3.714 | 0.3095 |  |  |
| Total | 14 | 5.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.556349 | 35.22% | 24.42% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 39.476 | 0.149 | 265.49 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.476 | 0.219 | -2.18 | 0.050 | 1.24 |
| 35 | -0.048 | 0.192 | -0.25 | 0.808 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus1 | = | 39.476 - 0.476 outside\_34 - 0.048 outside\_35 + 0.524 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus1 | Fit | Resid | Std Resid |  |
| 12 | 40.000 | 39.000 | 1.000 | 2.08 | R |
| 14 | 38.000 | 39.000 | -1.000 | -2.08 | R |

R  Large residual

General Linear Model: near aloe versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.755 | 1.3774 | 2.68 | 0.109 |
| Error | 12 | 6.179 | 0.5149 |  |  |
| Total | 14 | 8.933 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.717552 | 30.84% | 19.31% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 34.155 | 0.192 | 178.10 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.155 | 0.282 | -0.55 | 0.594 | 1.24 |
| 35 | -0.440 | 0.248 | -1.78 | 0.101 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe | = | 34.155 - 0.155 outside\_34 - 0.440 outside\_35 + 0.595 outside\_36 |

General Linear Model: near aloe1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 0.5548 | 0.2774 | 1.05 | 0.381 |
| Error | 12 | 3.1786 | 0.2649 |  |  |
| Total | 14 | 3.7333 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.514666 | 14.86% | 0.67% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 38.512 | 0.138 | 279.98 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.012 | 0.202 | -0.06 | 0.954 | 1.24 |
| 35 | -0.226 | 0.178 | -1.27 | 0.227 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe1 | = | 38.512 - 0.012 outside\_34 - 0.226 outside\_35 + 0.238 outside\_36 |

Autocorrelation Function: east

Autocorrelations

|  |  |  |  |
| --- | --- | --- | --- |
| Lag | ACF | T | LBQ |
| 1 | -0.700775 | -2.71 | 8.94 |
| 2 | 0.563566 | 1.55 | 15.17 |
| 3 | -0.532558 | -1.27 | 21.20 |
| 4 | 0.475969 | 1.03 | 26.45 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |

Probability Plot of east, north

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 39, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 40, south = 42) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 41, south = 40) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 41, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 39, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 40, south = 42) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 41, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Linear Model Analysis: SN ratios versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for SN ratios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 30.7384 | 1.6450 | 18.686 | 0.000 |
| outside 34 | 2.4240 | 2.0796 | 1.166 | 0.328 |
| outside 35 | -2.1833 | 1.2752 | -1.712 | 0.185 |
| near alo 33 | 0.2436 | 1.7278 | 0.141 | 0.897 |
| near alo 34 | 2.0028 | 1.7959 | 1.115 | 0.346 |
| near cac 32 | 2.4000 | 2.6834 | 0.894 | 0.437 |
| near cac 33 | 1.1570 | 1.8901 | 0.612 | 0.584 |
| near cac 34 | -1.1606 | 2.2719 | -0.511 | 0.645 |
| near alo 38 | -0.4522 | 0.8830 | -0.512 | 0.644 |
| near cac 38 | -1.6192 | 3.7096 | -0.436 | 0.692 |
| near cac 39 | -0.6041 | 2.5969 | -0.233 | 0.831 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 2.2974 | 68.63% | 0.00% |

Analysis of Variance for SN ratios

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 23.4900 | 15.602 | 7.801 | 1.48 | 0.357 |
| near aloe | 2 | 1.6903 | 6.590 | 3.295 | 0.62 | 0.593 |
| near cactus | 3 | 3.2046 | 5.427 | 1.809 | 0.34 | 0.799 |
| near aloe1 | 1 | 0.0817 | 1.384 | 1.384 | 0.26 | 0.644 |
| near cactus1 | 2 | 6.1690 | 6.169 | 3.085 | 0.58 | 0.610 |
| Residual Error | 3 | 15.8336 | 15.834 | 5.278 |  |  |
| Total | 13 | 50.4692 |  |  |  |  |

Unusual Observations for SN ratios

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | SN ratios | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 29.245 | 29.245 | 2.297 | 0.000 | \* |  | X |
| 5 | 30.142 | 30.142 | 2.297 | 0.000 | \* |  | X |
| 12 | 34.017 | 34.017 | 2.297 | -0.000 | \* |  | X |
| 14 | 32.149 | 32.149 | 2.297 | 0.000 | \* |  | X |

X denotes an observation whose X value gives it large leverage.

Linear Model Analysis: Means versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for Means

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 40.7880 | 0.2383 | 171.180 | 0.000 |
| outside 34 | 0.0781 | 0.3012 | 0.259 | 0.812 |
| outside 35 | 0.1392 | 0.1847 | 0.754 | 0.506 |
| near alo 33 | 0.1174 | 0.2503 | 0.469 | 0.671 |
| near alo 34 | -0.0104 | 0.2601 | -0.040 | 0.971 |
| near cac 32 | 0.2844 | 0.3887 | 0.732 | 0.517 |
| near cac 33 | -0.0266 | 0.2738 | -0.097 | 0.929 |
| near cac 34 | -0.2667 | 0.3291 | -0.810 | 0.477 |
| near alo 38 | -0.0895 | 0.1279 | -0.700 | 0.535 |
| near cac 38 | -0.6330 | 0.5373 | -1.178 | 0.324 |
| near cac 39 | 0.2604 | 0.3762 | 0.692 | 0.539 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3328 | 70.85% | 0.00% |

Analysis of Variance for Means

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.28757 | 0.15341 | 0.07670 | 0.69 | 0.566 |
| near aloe | 2 | 0.07586 | 0.02628 | 0.01314 | 0.12 | 0.892 |
| near cactus | 3 | 0.23883 | 0.11215 | 0.03738 | 0.34 | 0.802 |
| near aloe1 | 1 | 0.03025 | 0.05421 | 0.05421 | 0.49 | 0.535 |
| near cactus1 | 2 | 0.17479 | 0.17479 | 0.08740 | 0.79 | 0.530 |
| Residual Error | 3 | 0.33221 | 0.33221 | 0.11074 |  |  |
| Total | 13 | 1.13951 |  |  |  |  |

Unusual Observations for Means

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | Means | Fit | SE Fit | Residual | St Resid |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 5 | 41.500 | 41.500 | 0.333 | 0.000 | \* |  | X |
| 12 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 14 | 40.500 | 40.500 | 0.333 | 0.000 | \* |  | X |

Linear Model Analysis: StDevs versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for StDevs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 1.21971 | 0.2211 | 5.518 | 0.012 |
| outside 34 | -0.32003 | 0.2795 | -1.145 | 0.335 |
| outside 35 | 0.28988 | 0.1714 | 1.692 | 0.189 |
| near alo 33 | -0.00162 | 0.2322 | -0.007 | 0.995 |
| near alo 34 | -0.25889 | 0.2413 | -1.073 | 0.362 |
| near cac 32 | -0.32876 | 0.3606 | -0.912 | 0.429 |
| near cac 33 | -0.15486 | 0.2540 | -0.610 | 0.585 |
| near cac 34 | 0.14977 | 0.3053 | 0.491 | 0.657 |
| near alo 38 | 0.04902 | 0.1187 | 0.413 | 0.707 |
| near cac 38 | 0.21759 | 0.4985 | 0.437 | 0.692 |
| near cac 39 | 0.06276 | 0.3490 | 0.180 | 0.869 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3087 | 67.06% | 0.00% |

Analysis of Variance for StDevs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.413907 | 0.27481 | 0.13740 | 1.44 | 0.364 |
| near aloe | 2 | 0.017237 | 0.11346 | 0.05673 | 0.60 | 0.606 |
| near cactus | 3 | 0.055201 | 0.10046 | 0.03349 | 0.35 | 0.793 |
| near aloe1 | 1 | 0.000281 | 0.01627 | 0.01627 | 0.17 | 0.707 |
| near cactus1 | 2 | 0.095332 | 0.09533 | 0.04767 | 0.50 | 0.649 |
| Residual Error | 3 | 0.285918 | 0.28592 | 0.09531 |  |  |
| Total | 13 | 0.867875 |  |  |  |  |

Unusual Observations for StDevs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | StDevs | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 1.414 | 1.414 | 0.309 | -0.000 | \* |  | X |
| 5 | 1.291 | 1.291 | 0.309 | -0.000 | \* |  | X |
| 12 | 0.816 | 0.816 | 0.309 | 0.000 | \* |  | X |
| 14 | 1.000 | 1.000 | 0.309 | 0.000 | \* |  | X |

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Response Table for Standard Deviations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 0.9728 | 1.2497 | 1.1455 | 1.1983 | 1.0000 |
| 2 | 1.3227 | 1.1129 | 1.2217 | 1.0877 | 1.2421 |
| 3 | 0.9872 | 1.1090 | 1.1275 |  | 1.0942 |
| 4 |  |  | 1.0374 |  |  |
| Delta | 0.3499 | 0.1407 | 0.1843 | 0.1106 | 0.2421 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Probability Plot of east

Probability Plot of west

Probability Plot of north

Probability Plot of south

Stability Worksheet

Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Testing times: | 9 | Batches: | 3 |
| Samples per batch at each time: | 1 | Total runs: | 27 |

Main Effects Plot for near aloe

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Linear Model Analysis: SN ratios versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for SN ratios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 30.7384 | 1.6450 | 18.686 | 0.000 |
| outside 34 | 2.4240 | 2.0796 | 1.166 | 0.328 |
| outside 35 | -2.1833 | 1.2752 | -1.712 | 0.185 |
| near alo 33 | 0.2436 | 1.7278 | 0.141 | 0.897 |
| near alo 34 | 2.0028 | 1.7959 | 1.115 | 0.346 |
| near cac 32 | 2.4000 | 2.6834 | 0.894 | 0.437 |
| near cac 33 | 1.1570 | 1.8901 | 0.612 | 0.584 |
| near cac 34 | -1.1606 | 2.2719 | -0.511 | 0.645 |
| near alo 38 | -0.4522 | 0.8830 | -0.512 | 0.644 |
| near cac 38 | -1.6192 | 3.7096 | -0.436 | 0.692 |
| near cac 39 | -0.6041 | 2.5969 | -0.233 | 0.831 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 2.2974 | 68.63% | 0.00% |

Analysis of Variance for SN ratios

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 23.4900 | 15.602 | 7.801 | 1.48 | 0.357 |
| near aloe | 2 | 1.6903 | 6.590 | 3.295 | 0.62 | 0.593 |
| near cactus | 3 | 3.2046 | 5.427 | 1.809 | 0.34 | 0.799 |
| near aloe1 | 1 | 0.0817 | 1.384 | 1.384 | 0.26 | 0.644 |
| near cactus1 | 2 | 6.1690 | 6.169 | 3.085 | 0.58 | 0.610 |
| Residual Error | 3 | 15.8336 | 15.834 | 5.278 |  |  |
| Total | 13 | 50.4692 |  |  |  |  |

Unusual Observations for SN ratios

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | SN ratios | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 29.245 | 29.245 | 2.297 | 0.000 | \* |  | X |
| 5 | 30.142 | 30.142 | 2.297 | 0.000 | \* |  | X |
| 12 | 34.017 | 34.017 | 2.297 | -0.000 | \* |  | X |
| 14 | 32.149 | 32.149 | 2.297 | 0.000 | \* |  | X |

X denotes an observation whose X value gives it large leverage.

Linear Model Analysis: Means versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for Means

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 40.7880 | 0.2383 | 171.180 | 0.000 |
| outside 34 | 0.0781 | 0.3012 | 0.259 | 0.812 |
| outside 35 | 0.1392 | 0.1847 | 0.754 | 0.506 |
| near alo 33 | 0.1174 | 0.2503 | 0.469 | 0.671 |
| near alo 34 | -0.0104 | 0.2601 | -0.040 | 0.971 |
| near cac 32 | 0.2844 | 0.3887 | 0.732 | 0.517 |
| near cac 33 | -0.0266 | 0.2738 | -0.097 | 0.929 |
| near cac 34 | -0.2667 | 0.3291 | -0.810 | 0.477 |
| near alo 38 | -0.0895 | 0.1279 | -0.700 | 0.535 |
| near cac 38 | -0.6330 | 0.5373 | -1.178 | 0.324 |
| near cac 39 | 0.2604 | 0.3762 | 0.692 | 0.539 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3328 | 70.85% | 0.00% |

Analysis of Variance for Means

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.28757 | 0.15341 | 0.07670 | 0.69 | 0.566 |
| near aloe | 2 | 0.07586 | 0.02628 | 0.01314 | 0.12 | 0.892 |
| near cactus | 3 | 0.23883 | 0.11215 | 0.03738 | 0.34 | 0.802 |
| near aloe1 | 1 | 0.03025 | 0.05421 | 0.05421 | 0.49 | 0.535 |
| near cactus1 | 2 | 0.17479 | 0.17479 | 0.08740 | 0.79 | 0.530 |
| Residual Error | 3 | 0.33221 | 0.33221 | 0.11074 |  |  |
| Total | 13 | 1.13951 |  |  |  |  |

Unusual Observations for Means

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | Means | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 5 | 41.500 | 41.500 | 0.333 | 0.000 | \* |  | X |
| 12 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 14 | 40.500 | 40.500 | 0.333 | 0.000 | \* |  | X |

Linear Model Analysis: StDevs versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for StDevs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 1.21971 | 0.2211 | 5.518 | 0.012 |
| outside 34 | -0.32003 | 0.2795 | -1.145 | 0.335 |
| outside 35 | 0.28988 | 0.1714 | 1.692 | 0.189 |
| near alo 33 | -0.00162 | 0.2322 | -0.007 | 0.995 |
| near alo 34 | -0.25889 | 0.2413 | -1.073 | 0.362 |
| near cac 32 | -0.32876 | 0.3606 | -0.912 | 0.429 |
| near cac 33 | -0.15486 | 0.2540 | -0.610 | 0.585 |
| near cac 34 | 0.14977 | 0.3053 | 0.491 | 0.657 |
| near alo 38 | 0.04902 | 0.1187 | 0.413 | 0.707 |
| near cac 38 | 0.21759 | 0.4985 | 0.437 | 0.692 |
| near cac 39 | 0.06276 | 0.3490 | 0.180 | 0.869 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3087 | 67.06% | 0.00% |

Analysis of Variance for StDevs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.413907 | 0.27481 | 0.13740 | 1.44 | 0.364 |
| near aloe | 2 | 0.017237 | 0.11346 | 0.05673 | 0.60 | 0.606 |
| near cactus | 3 | 0.055201 | 0.10046 | 0.03349 | 0.35 | 0.793 |
| near aloe1 | 1 | 0.000281 | 0.01627 | 0.01627 | 0.17 | 0.707 |
| near cactus1 | 2 | 0.095332 | 0.09533 | 0.04767 | 0.50 | 0.649 |
| Residual Error | 3 | 0.285918 | 0.28592 | 0.09531 |  |  |
| Total | 13 | 0.867875 |  |  |  |  |

Unusual Observations for StDevs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | StDevs | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 1.414 | 1.414 | 0.309 | -0.000 | \* |  | X |
| 5 | 1.291 | 1.291 | 0.309 | -0.000 | \* |  | X |
| 12 | 0.816 | 0.816 | 0.309 | 0.000 | \* |  | X |
| 14 | 1.000 | 1.000 | 0.309 | 0.000 | \* |  | X |

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Response Table for Standard Deviations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 0.9728 | 1.2497 | 1.1455 | 1.1983 | 1.0000 |
| 2 | 1.3227 | 1.1129 | 1.2217 | 1.0877 | 1.2421 |
| 3 | 0.9872 | 1.1090 | 1.1275 |  | 1.0942 |
| 4 |  |  | 1.0374 |  |  |
| Delta | 0.3499 | 0.1407 | 0.1843 | 0.1106 | 0.2421 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Main Effects Plot for Means

Main Effects Plot for SN ratios

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |







Pareto Chart of outside by near aloe

Nested ANOVA: near cactus, near cactus1, near aloe, near aloe1

Nested ANOVA: near cactus versus outside

Analysis of Variance for near cactus

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 1.5548 | 0.7774 |
| Error | 12 | 10.1786 | 0.8482 |
| Total | 14 | 11.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | -0.015\* | 0.00 | 0.000 |
| Error | 0.848 | 100.00 | 0.921 |
| Total | 0.848 |  | 0.921 |

\* Value is negative, and is estimated by zero.

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near cactus1 versus outside

Analysis of Variance for near cactus1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.0190 | 1.0095 |
| Error | 12 | 3.7143 | 0.3095 |
| Total | 14 | 5.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.146 | 32.03 | 0.382 |
| Error | 0.310 | 67.97 | 0.556 |
| Total | 0.455 |  | 0.675 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe versus outside

Analysis of Variance for near aloe

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.7548 | 1.3774 |
| Error | 12 | 6.1786 | 0.5149 |
| Total | 14 | 8.9333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.180 | 25.87 | 0.424 |
| Error | 0.515 | 74.13 | 0.718 |
| Total | 0.695 |  | 0.833 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe1 versus outside

Analysis of Variance for near aloe1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 0.5548 | 0.2774 |
| Error | 12 | 3.1786 | 0.2649 |
| Total | 14 | 3.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.003 | 0.97 | 0.051 |
| Error | 0.265 | 99.03 | 0.515 |
| Total | 0.267 |  | 0.517 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

General Linear Model: near cactus versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 1.555 | 0.7774 | 0.92 | 0.426 |
| Error | 12 | 10.179 | 0.8482 |  |  |
| Total | 14 | 11.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.920985 | 13.25% | 0.00% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 33.512 | 0.246 | 136.15 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | 0.488 | 0.362 | 1.35 | 0.203 | 1.24 |
| 35 | -0.226 | 0.318 | -0.71 | 0.490 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus | = | 33.512 + 0.488 outside\_34 - 0.226 outside\_35 - 0.262 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus | Fit | Resid | Std Resid |  |
| 14 | 32.000 | 34.000 | -2.000 | -2.51 | R |

R  Large residual

General Linear Model: near cactus1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.019 | 1.0095 | 3.26 | 0.074 |
| Error | 12 | 3.714 | 0.3095 |  |  |
| Total | 14 | 5.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.556349 | 35.22% | 24.42% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 39.476 | 0.149 | 265.49 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.476 | 0.219 | -2.18 | 0.050 | 1.24 |
| 35 | -0.048 | 0.192 | -0.25 | 0.808 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus1 | = | 39.476 - 0.476 outside\_34 - 0.048 outside\_35 + 0.524 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus1 | Fit | Resid | Std Resid |  |
| 12 | 40.000 | 39.000 | 1.000 | 2.08 | R |
| 14 | 38.000 | 39.000 | -1.000 | -2.08 | R |

R  Large residual

General Linear Model: near aloe versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.755 | 1.3774 | 2.68 | 0.109 |
| Error | 12 | 6.179 | 0.5149 |  |  |
| Total | 14 | 8.933 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.717552 | 30.84% | 19.31% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 34.155 | 0.192 | 178.10 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.155 | 0.282 | -0.55 | 0.594 | 1.24 |
| 35 | -0.440 | 0.248 | -1.78 | 0.101 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe | = | 34.155 - 0.155 outside\_34 - 0.440 outside\_35 + 0.595 outside\_36 |

General Linear Model: near aloe1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 0.5548 | 0.2774 | 1.05 | 0.381 |
| Error | 12 | 3.1786 | 0.2649 |  |  |
| Total | 14 | 3.7333 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.514666 | 14.86% | 0.67% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 38.512 | 0.138 | 279.98 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.012 | 0.202 | -0.06 | 0.954 | 1.24 |
| 35 | -0.226 | 0.178 | -1.27 | 0.227 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe1 | = | 38.512 - 0.012 outside\_34 - 0.226 outside\_35 + 0.238 outside\_36 |

Autocorrelation Function: east

Autocorrelations

|  |  |  |  |
| --- | --- | --- | --- |
| Lag | ACF | T | LBQ |
| 1 | -0.700775 | -2.71 | 8.94 |
| 2 | 0.563566 | 1.55 | 15.17 |
| 3 | -0.532558 | -1.27 | 21.20 |
| 4 | 0.475969 | 1.03 | 26.45 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |

Probability Plot of east, north

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 39, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 40, south = 42) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 41, south = 40) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in east (for west  
= 41, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 39, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 40, south = 42) must be greater than or equal to the number of estimated distribution  
parameters.

\* NOTE \* Distribution could not be fit. The number of distinct rows of data in north (for  
west = 41, south = 41) must be greater than or equal to the number of estimated distribution  
parameters.

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Linear Model Analysis: SN ratios versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for SN ratios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 30.7384 | 1.6450 | 18.686 | 0.000 |
| outside 34 | 2.4240 | 2.0796 | 1.166 | 0.328 |
| outside 35 | -2.1833 | 1.2752 | -1.712 | 0.185 |
| near alo 33 | 0.2436 | 1.7278 | 0.141 | 0.897 |
| near alo 34 | 2.0028 | 1.7959 | 1.115 | 0.346 |
| near cac 32 | 2.4000 | 2.6834 | 0.894 | 0.437 |
| near cac 33 | 1.1570 | 1.8901 | 0.612 | 0.584 |
| near cac 34 | -1.1606 | 2.2719 | -0.511 | 0.645 |
| near alo 38 | -0.4522 | 0.8830 | -0.512 | 0.644 |
| near cac 38 | -1.6192 | 3.7096 | -0.436 | 0.692 |
| near cac 39 | -0.6041 | 2.5969 | -0.233 | 0.831 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 2.2974 | 68.63% | 0.00% |

Analysis of Variance for SN ratios

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 23.4900 | 15.602 | 7.801 | 1.48 | 0.357 |
| near aloe | 2 | 1.6903 | 6.590 | 3.295 | 0.62 | 0.593 |
| near cactus | 3 | 3.2046 | 5.427 | 1.809 | 0.34 | 0.799 |
| near aloe1 | 1 | 0.0817 | 1.384 | 1.384 | 0.26 | 0.644 |
| near cactus1 | 2 | 6.1690 | 6.169 | 3.085 | 0.58 | 0.610 |
| Residual Error | 3 | 15.8336 | 15.834 | 5.278 |  |  |
| Total | 13 | 50.4692 |  |  |  |  |

Unusual Observations for SN ratios

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | SN ratios | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 29.245 | 29.245 | 2.297 | 0.000 | \* |  | X |
| 5 | 30.142 | 30.142 | 2.297 | 0.000 | \* |  | X |
| 12 | 34.017 | 34.017 | 2.297 | -0.000 | \* |  | X |
| 14 | 32.149 | 32.149 | 2.297 | 0.000 | \* |  | X |

X denotes an observation whose X value gives it large leverage.

Linear Model Analysis: Means versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for Means

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 40.7880 | 0.2383 | 171.180 | 0.000 |
| outside 34 | 0.0781 | 0.3012 | 0.259 | 0.812 |
| outside 35 | 0.1392 | 0.1847 | 0.754 | 0.506 |
| near alo 33 | 0.1174 | 0.2503 | 0.469 | 0.671 |
| near alo 34 | -0.0104 | 0.2601 | -0.040 | 0.971 |
| near cac 32 | 0.2844 | 0.3887 | 0.732 | 0.517 |
| near cac 33 | -0.0266 | 0.2738 | -0.097 | 0.929 |
| near cac 34 | -0.2667 | 0.3291 | -0.810 | 0.477 |
| near alo 38 | -0.0895 | 0.1279 | -0.700 | 0.535 |
| near cac 38 | -0.6330 | 0.5373 | -1.178 | 0.324 |
| near cac 39 | 0.2604 | 0.3762 | 0.692 | 0.539 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3328 | 70.85% | 0.00% |

Analysis of Variance for Means

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.28757 | 0.15341 | 0.07670 | 0.69 | 0.566 |
| near aloe | 2 | 0.07586 | 0.02628 | 0.01314 | 0.12 | 0.892 |
| near cactus | 3 | 0.23883 | 0.11215 | 0.03738 | 0.34 | 0.802 |
| near aloe1 | 1 | 0.03025 | 0.05421 | 0.05421 | 0.49 | 0.535 |
| near cactus1 | 2 | 0.17479 | 0.17479 | 0.08740 | 0.79 | 0.530 |
| Residual Error | 3 | 0.33221 | 0.33221 | 0.11074 |  |  |
| Total | 13 | 1.13951 |  |  |  |  |

Unusual Observations for Means

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | Means | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 5 | 41.500 | 41.500 | 0.333 | 0.000 | \* |  | X |
| 12 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 14 | 40.500 | 40.500 | 0.333 | 0.000 | \* |  | X |

Linear Model Analysis: StDevs versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for StDevs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 1.21971 | 0.2211 | 5.518 | 0.012 |
| outside 34 | -0.32003 | 0.2795 | -1.145 | 0.335 |
| outside 35 | 0.28988 | 0.1714 | 1.692 | 0.189 |
| near alo 33 | -0.00162 | 0.2322 | -0.007 | 0.995 |
| near alo 34 | -0.25889 | 0.2413 | -1.073 | 0.362 |
| near cac 32 | -0.32876 | 0.3606 | -0.912 | 0.429 |
| near cac 33 | -0.15486 | 0.2540 | -0.610 | 0.585 |
| near cac 34 | 0.14977 | 0.3053 | 0.491 | 0.657 |
| near alo 38 | 0.04902 | 0.1187 | 0.413 | 0.707 |
| near cac 38 | 0.21759 | 0.4985 | 0.437 | 0.692 |
| near cac 39 | 0.06276 | 0.3490 | 0.180 | 0.869 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3087 | 67.06% | 0.00% |

Analysis of Variance for StDevs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.413907 | 0.27481 | 0.13740 | 1.44 | 0.364 |
| near aloe | 2 | 0.017237 | 0.11346 | 0.05673 | 0.60 | 0.606 |
| near cactus | 3 | 0.055201 | 0.10046 | 0.03349 | 0.35 | 0.793 |
| near aloe1 | 1 | 0.000281 | 0.01627 | 0.01627 | 0.17 | 0.707 |
| near cactus1 | 2 | 0.095332 | 0.09533 | 0.04767 | 0.50 | 0.649 |
| Residual Error | 3 | 0.285918 | 0.28592 | 0.09531 |  |  |
| Total | 13 | 0.867875 |  |  |  |  |

Unusual Observations for StDevs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | StDevs | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 1.414 | 1.414 | 0.309 | -0.000 | \* |  | X |
| 5 | 1.291 | 1.291 | 0.309 | -0.000 | \* |  | X |
| 12 | 0.816 | 0.816 | 0.309 | 0.000 | \* |  | X |
| 14 | 1.000 | 1.000 | 0.309 | 0.000 | \* |  | X |

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Response Table for Standard Deviations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 0.9728 | 1.2497 | 1.1455 | 1.1983 | 1.0000 |
| 2 | 1.3227 | 1.1129 | 1.2217 | 1.0877 | 1.2421 |
| 3 | 0.9872 | 1.1090 | 1.1275 |  | 1.0942 |
| 4 |  |  | 1.0374 |  |  |
| Delta | 0.3499 | 0.1407 | 0.1843 | 0.1106 | 0.2421 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Probability Plot of east

Probability Plot of west

Probability Plot of north

Probability Plot of south

Stability Worksheet

Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Testing times: | 9 | Batches: | 3 |
| Samples per batch at each time: | 1 | Total runs: | 27 |

Main Effects Plot for near aloe

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Linear Model Analysis: SN ratios versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for SN ratios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 30.7384 | 1.6450 | 18.686 | 0.000 |
| outside 34 | 2.4240 | 2.0796 | 1.166 | 0.328 |
| outside 35 | -2.1833 | 1.2752 | -1.712 | 0.185 |
| near alo 33 | 0.2436 | 1.7278 | 0.141 | 0.897 |
| near alo 34 | 2.0028 | 1.7959 | 1.115 | 0.346 |
| near cac 32 | 2.4000 | 2.6834 | 0.894 | 0.437 |
| near cac 33 | 1.1570 | 1.8901 | 0.612 | 0.584 |
| near cac 34 | -1.1606 | 2.2719 | -0.511 | 0.645 |
| near alo 38 | -0.4522 | 0.8830 | -0.512 | 0.644 |
| near cac 38 | -1.6192 | 3.7096 | -0.436 | 0.692 |
| near cac 39 | -0.6041 | 2.5969 | -0.233 | 0.831 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 2.2974 | 68.63% | 0.00% |

Analysis of Variance for SN ratios

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 23.4900 | 15.602 | 7.801 | 1.48 | 0.357 |
| near aloe | 2 | 1.6903 | 6.590 | 3.295 | 0.62 | 0.593 |
| near cactus | 3 | 3.2046 | 5.427 | 1.809 | 0.34 | 0.799 |
| near aloe1 | 1 | 0.0817 | 1.384 | 1.384 | 0.26 | 0.644 |
| near cactus1 | 2 | 6.1690 | 6.169 | 3.085 | 0.58 | 0.610 |
| Residual Error | 3 | 15.8336 | 15.834 | 5.278 |  |  |
| Total | 13 | 50.4692 |  |  |  |  |

Unusual Observations for SN ratios

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | SN ratios | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 29.245 | 29.245 | 2.297 | 0.000 | \* |  | X |
| 5 | 30.142 | 30.142 | 2.297 | 0.000 | \* |  | X |
| 12 | 34.017 | 34.017 | 2.297 | -0.000 | \* |  | X |
| 14 | 32.149 | 32.149 | 2.297 | 0.000 | \* |  | X |

X denotes an observation whose X value gives it large leverage.

Linear Model Analysis: Means versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for Means

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 40.7880 | 0.2383 | 171.180 | 0.000 |
| outside 34 | 0.0781 | 0.3012 | 0.259 | 0.812 |
| outside 35 | 0.1392 | 0.1847 | 0.754 | 0.506 |
| near alo 33 | 0.1174 | 0.2503 | 0.469 | 0.671 |
| near alo 34 | -0.0104 | 0.2601 | -0.040 | 0.971 |
| near cac 32 | 0.2844 | 0.3887 | 0.732 | 0.517 |
| near cac 33 | -0.0266 | 0.2738 | -0.097 | 0.929 |
| near cac 34 | -0.2667 | 0.3291 | -0.810 | 0.477 |
| near alo 38 | -0.0895 | 0.1279 | -0.700 | 0.535 |
| near cac 38 | -0.6330 | 0.5373 | -1.178 | 0.324 |
| near cac 39 | 0.2604 | 0.3762 | 0.692 | 0.539 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3328 | 70.85% | 0.00% |

Analysis of Variance for Means

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.28757 | 0.15341 | 0.07670 | 0.69 | 0.566 |
| near aloe | 2 | 0.07586 | 0.02628 | 0.01314 | 0.12 | 0.892 |
| near cactus | 3 | 0.23883 | 0.11215 | 0.03738 | 0.34 | 0.802 |
| near aloe1 | 1 | 0.03025 | 0.05421 | 0.05421 | 0.49 | 0.535 |
| near cactus1 | 2 | 0.17479 | 0.17479 | 0.08740 | 0.79 | 0.530 |
| Residual Error | 3 | 0.33221 | 0.33221 | 0.11074 |  |  |
| Total | 13 | 1.13951 |  |  |  |  |

Unusual Observations for Means

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | Means | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 5 | 41.500 | 41.500 | 0.333 | 0.000 | \* |  | X |
| 12 | 41.000 | 41.000 | 0.333 | 0.000 | \* |  | X |
| 14 | 40.500 | 40.500 | 0.333 | 0.000 | \* |  | X |

Linear Model Analysis: StDevs versus outside, near aloe, near cactus, near aloe1, near cactus1

Estimated Model Coefficients for StDevs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T | P |
| Constant | 1.21971 | 0.2211 | 5.518 | 0.012 |
| outside 34 | -0.32003 | 0.2795 | -1.145 | 0.335 |
| outside 35 | 0.28988 | 0.1714 | 1.692 | 0.189 |
| near alo 33 | -0.00162 | 0.2322 | -0.007 | 0.995 |
| near alo 34 | -0.25889 | 0.2413 | -1.073 | 0.362 |
| near cac 32 | -0.32876 | 0.3606 | -0.912 | 0.429 |
| near cac 33 | -0.15486 | 0.2540 | -0.610 | 0.585 |
| near cac 34 | 0.14977 | 0.3053 | 0.491 | 0.657 |
| near alo 38 | 0.04902 | 0.1187 | 0.413 | 0.707 |
| near cac 38 | 0.21759 | 0.4985 | 0.437 | 0.692 |
| near cac 39 | 0.06276 | 0.3490 | 0.180 | 0.869 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-Sq | R-Sq(adj) |
| 0.3087 | 67.06% | 0.00% |

Analysis of Variance for StDevs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Source | DF | Seq SS | Adj SS | Adj MS | F | P |
| outside | 2 | 0.413907 | 0.27481 | 0.13740 | 1.44 | 0.364 |
| near aloe | 2 | 0.017237 | 0.11346 | 0.05673 | 0.60 | 0.606 |
| near cactus | 3 | 0.055201 | 0.10046 | 0.03349 | 0.35 | 0.793 |
| near aloe1 | 1 | 0.000281 | 0.01627 | 0.01627 | 0.17 | 0.707 |
| near cactus1 | 2 | 0.095332 | 0.09533 | 0.04767 | 0.50 | 0.649 |
| Residual Error | 3 | 0.285918 | 0.28592 | 0.09531 |  |  |
| Total | 13 | 0.867875 |  |  |  |  |

Unusual Observations for StDevs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Observation | StDevs | Fit | SE Fit | Residual | St Resid |  |  |
| 2 | 1.414 | 1.414 | 0.309 | -0.000 | \* |  | X |
| 5 | 1.291 | 1.291 | 0.309 | -0.000 | \* |  | X |
| 12 | 0.816 | 0.816 | 0.309 | 0.000 | \* |  | X |
| 14 | 1.000 | 1.000 | 0.309 | 0.000 | \* |  | X |

Response Table for Signal to Noise Ratios

Nominal is best (10×Log10(Ybar^2/s^2))

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 32.62 | 30.62 | 31.15 | 30.90 | 32.15 |
| 2 | 29.95 | 31.57 | 30.59 | 31.71 | 30.55 |
| 3 | 32.43 | 31.39 | 31.57 |  | 31.72 |
| 4 |  |  | 32.16 |  |  |
| Delta | 2.67 | 0.95 | 1.57 | 0.81 | 1.60 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Response Table for Means

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 40.94 | 41.19 | 41.00 | 41.06 | 40.50 |
| 2 | 41.14 | 41.00 | 41.02 | 40.94 | 41.17 |
| 3 | 40.79 | 40.84 | 40.95 |  | 40.95 |
| 4 |  |  | 41.13 |  |  |
| Delta | 0.35 | 0.34 | 0.17 | 0.13 | 0.67 |
| Rank | 2 | 3 | 4 | 5 | 1 |

Response Table for Standard Deviations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Level | outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 1 | 0.9728 | 1.2497 | 1.1455 | 1.1983 | 1.0000 |
| 2 | 1.3227 | 1.1129 | 1.2217 | 1.0877 | 1.2421 |
| 3 | 0.9872 | 1.1090 | 1.1275 |  | 1.0942 |
| 4 |  |  | 1.0374 |  |  |
| Delta | 0.3499 | 0.1407 | 0.1843 | 0.1106 | 0.2421 |
| Rank | 1 | 4 | 3 | 5 | 2 |

Main Effects Plot for Means

Main Effects Plot for SN ratios

Taguchi Analysis: east, west, north, south versus outside, ... ar cactus1

\* NOTE \* Design is not orthogonal.

Predicted values

\* NOTE \* Design is not orthogonal.

Prediction

|  |  |  |  |
| --- | --- | --- | --- |
| S/N Ratio | Mean | StDev | Ln(StDev) |
| 33.7348 | 40.5455 | 0.835915 | -0.181412 |

Settings

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| outside | near aloe | near cactus | near aloe1 | near cactus1 |
| 34 | 33 | 32 | 38 | 38 |













 Pareto Chart of outside by near aloe

Nested ANOVA: near cactus, near cactus1, near aloe, near aloe1

Nested ANOVA: near cactus versus outside

Analysis of Variance for near cactus

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 1.5548 | 0.7774 |
| Error | 12 | 10.1786 | 0.8482 |
| Total | 14 | 11.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | -0.015\* | 0.00 | 0.000 |
| Error | 0.848 | 100.00 | 0.921 |
| Total | 0.848 |  | 0.921 |

*\* Value is negative, and is estimated by zero.*

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near cactus1 versus outside

Analysis of Variance for near cactus1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.0190 | 1.0095 |
| Error | 12 | 3.7143 | 0.3095 |
| Total | 14 | 5.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.146 | 32.03 | 0.382 |
| Error | 0.310 | 67.97 | 0.556 |
| Total | 0.455 |  | 0.675 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe versus outside

Analysis of Variance for near aloe

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 2.7548 | 1.3774 |
| Error | 12 | 6.1786 | 0.5149 |
| Total | 14 | 8.9333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.180 | 25.87 | 0.424 |
| Error | 0.515 | 74.13 | 0.718 |
| Total | 0.695 |  | 0.833 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

Nested ANOVA: near aloe1 versus outside

Analysis of Variance for near aloe1

|  |  |  |  |
| --- | --- | --- | --- |
| Source | DF | SS | MS |
| outside | 2 | 0.5548 | 0.2774 |
| Error | 12 | 3.1786 | 0.2649 |
| Total | 14 | 3.7333 |  |

Variance Components

|  |  |  |  |
| --- | --- | --- | --- |
| Source | Var Comp. | % of Total | StDev |
| outside | 0.003 | 0.97 | 0.051 |
| Error | 0.265 | 99.03 | 0.515 |
| Total | 0.267 |  | 0.517 |

Expected Mean Squares

|  |  |  |
| --- | --- | --- |
| 1 | outside | 1.00(2) +  4.80(1) |
| 2 | Error | 1.00(2) |

General Linear Model: near cactus versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 1.555 | 0.7774 | 0.92 | 0.426 |
| Error | 12 | 10.179 | 0.8482 |  |  |
| Total | 14 | 11.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.920985 | 13.25% | 0.00% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 33.512 | 0.246 | 136.15 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | 0.488 | 0.362 | 1.35 | 0.203 | 1.24 |
| 35 | -0.226 | 0.318 | -0.71 | 0.490 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus | = | 33.512 + 0.488 outside\_34 - 0.226 outside\_35 - 0.262 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus | Fit | Resid | Std Resid |  |
| 14 | 32.000 | 34.000 | -2.000 | -2.51 | R |

*R  Large residual*

General Linear Model: near cactus1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.019 | 1.0095 | 3.26 | 0.074 |
| Error | 12 | 3.714 | 0.3095 |  |  |
| Total | 14 | 5.733 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.556349 | 35.22% | 24.42% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 39.476 | 0.149 | 265.49 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.476 | 0.219 | -2.18 | 0.050 | 1.24 |
| 35 | -0.048 | 0.192 | -0.25 | 0.808 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near cactus1 | = | 39.476 - 0.476 outside\_34 - 0.048 outside\_35 + 0.524 outside\_36 |

Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | near cactus1 | Fit | Resid | Std Resid |  |
| 12 | 40.000 | 39.000 | 1.000 | 2.08 | R |
| 14 | 38.000 | 39.000 | -1.000 | -2.08 | R |

*R  Large residual*

General Linear Model: near aloe versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 2.755 | 1.3774 | 2.68 | 0.109 |
| Error | 12 | 6.179 | 0.5149 |  |  |
| Total | 14 | 8.933 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.717552 | 30.84% | 19.31% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 34.155 | 0.192 | 178.10 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.155 | 0.282 | -0.55 | 0.594 | 1.24 |
| 35 | -0.440 | 0.248 | -1.78 | 0.101 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe | = | 34.155 - 0.155 outside\_34 - 0.440 outside\_35 + 0.595 outside\_36 |

General Linear Model: near aloe1 versus outside

Method

|  |  |
| --- | --- |
| Factor coding | (-1, 0, +1) |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Fixed | 3 | 34, 35, 36 |

Analysis of Variance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
| outside | 2 | 0.5548 | 0.2774 | 1.05 | 0.381 |
| Error | 12 | 3.1786 | 0.2649 |  |  |
| Total | 14 | 3.7333 |  |  |  |

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| S | R-sq | R-sq(adj) | R-sq(pred) |
| 0.514666 | 14.86% | 0.67% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | T-Value | P-Value | VIF |
| Constant | 38.512 | 0.138 | 279.98 | 0.000 |  |
| outside |  |  |  |  |  |
| 34 | -0.012 | 0.202 | -0.06 | 0.954 | 1.24 |
| 35 | -0.226 | 0.178 | -1.27 | 0.227 | 1.24 |

Regression Equation

|  |  |  |
| --- | --- | --- |
| near aloe1 | = | 38.512 - 0.012 outside\_34 - 0.226 outside\_35 + 0.238 outside\_36 |

Item Analysis of outside, near aloe, near aloe1, near ... s, near cactus1

Correlation Matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | outside | near aloe | near aloe1 | near cactus |
| near aloe | 0.355 |  |  |  |
| near aloe1 | 0.183 | 0.612 |  |  |
| near cactus | -0.310 | -0.241 | -0.040 |  |
| near cactus1 | 0.591 | 0.075 | -0.058 | 0.211 |

*Cell Contents  
      Pearson correlation*

Item and Total Statistics

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Total Count | Mean | StDev |
| outside | 15 | 35.00 | 0.76 |
| near aloe | 15 | 34.07 | 0.80 |
| near aloe1 | 15 | 38.47 | 0.52 |
| near cactus | 15 | 33.47 | 0.92 |
| near cactus1 | 15 | 39.47 | 0.64 |
| Total | 15 | 180.47 | 1.96 |

Cronbach’s Alpha

|  |
| --- |
| Alpha |
| 0.3629 |

Omitted Item Statistics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Omitted Variable | Adj. Total Mean | Adj. Total StDev | Item-Adj. Total Corr | Squared Multiple Corr | Cronbach’s Alpha |
| outside | 145.467 | 1.598 | 0.2957 | 0.5970 | 0.2090 |
| near aloe | 146.400 | 1.595 | 0.2579 | 0.4581 | 0.2397 |
| near aloe1 | 142.000 | 1.732 | 0.3194 | 0.4185 | 0.2413 |
| near cactus | 147.000 | 1.890 | -0.1651 | 0.3724 | 0.6293 |
| near cactus1 | 141.000 | 1.604 | 0.4176 | 0.5524 | 0.1333 |

Interaction Plot for near aloe

Johnson Transformation for outside, near aloe, near ... st, north, south

Pie Chart of outside, near aloe, near cactus, near aloe1, ...

Pie Chart of outside, near aloe, near cactus, near aloe1, ...

Scatterplot of near aloe vs outside

Scatterplot of near aloe vs outside

Scatterplot of near cactus vs outside

Scatterplot of near cactus vs outside

Scatterplot of near aloe1 vs outside

Scatterplot of near aloe1 vs outside

Scatterplot of near cactus1 vs outside

Scatterplot of near cactus1 vs outside

Chart of east, north, south, west

Trend Analysis for east

Method

|  |  |
| --- | --- |
| Model type | Quadratic Trend Model |
| Data | east |
| Length | 15 |
| NMissing | 0 |

Fitted Trend Equation

|  |
| --- |
| Yt = 42.705 - 0.091×t + 0.0059×t^2 |

Accuracy Measures

|  |  |
| --- | --- |
| MAPE | 1.33239 |
| MAD | 0.56396 |
| MSD | 0.37242 |

Trend Analysis Plot for east

Trend Analysis for south

Method

|  |  |
| --- | --- |
| Model type | Linear Trend Model |
| Data | south |
| Length | 15 |
| NMissing | 0 |

Fitted Trend Equation

|  |
| --- |
| Yt = 40.448 + 0.0357×t |

Accuracy Measures

|  |  |
| --- | --- |
| MAPE | 1.12051 |
| MAD | 0.45556 |
| MSD | 0.30508 |

Single Exponential Smoothing for east

Method

|  |  |
| --- | --- |
| Data | east |
| Length | 15 |

Smoothing Constant

|  |  |
| --- | --- |
| α | 0.0783544 |

Accuracy Measures

|  |  |
| --- | --- |
| MAPE | 1.40720 |
| MAD | 0.59686 |
| MSD | 0.42412 |

Symmetry Plot for east

Mixed Effects Model: east versus outside, near aloe, near ... ear cactus

Method

|  |  |
| --- | --- |
| Variance estimation | Restricted maximum likelihood |
| DF for fixed effects | Kenward-Roger |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Random | 3 | 34, 35, 36 |
| near aloe | Fixed | 3 | 33, 34, 35 |
| near aloe1 | Fixed | 2 | 38, 39 |
| near cactus1 | Fixed | 3 | 38, 39, 40 |
| near cactus | Fixed | 4 | 32, 33, 34, 35 |

Variance Components

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Var | % of Total | SE Var | Z-Value | P-Value |
| outside | 0.000000 | 0.00% | \* | \* | \* |
| Error | 0.628788 | 100.00% | 0.363031 | 1.732051 | 0.042 |
| Total | 0.628788 |  |  |  |  |

*-2 Log likelihood = 27.967311*

Tests of Fixed Effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | DF Num | DF Den | F-Value | P-Value |
| near aloe | 2.00 | 6.00 | 0.12 | 0.891 |
| near aloe1 | 1.00 | 6.00 | 0.10 | 0.767 |
| near cactus1 | 2.00 | 6.00 | 0.53 | 0.614 |
| near cactus | 3.00 | 6.00 | 0.12 | 0.942 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-sq | R-sq(adj) |
| 0.792961 | 34.20% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | DF | T-Value | P-Value |
| Constant | 42.318182 | 0.379863 | 6.00 | 111.403876 | 0.000 |
| near aloe |  |  |  |  |  |
| 33 | 0.000000 | 0.560708 | 6.00 | 0.000000 | 1.000 |
| 34 | -0.272727 | 0.593719 | 6.00 | -0.459354 | 0.662 |
| near aloe1 |  |  |  |  |  |
| 38 | 0.090909 | 0.292820 | 6.00 | 0.310460 | 0.767 |
| near cactus1 |  |  |  |  |  |
| 38 | -0.386364 | 0.934939 | 6.00 | -0.413250 | 0.694 |
| 39 | 0.704545 | 0.773191 | 6.00 | 0.911217 | 0.397 |
| near cactus |  |  |  |  |  |
| 32 | -0.113636 | 0.778181 | 6.00 | -0.146028 | 0.889 |
| 33 | 0.022727 | 0.565467 | 6.00 | 0.040192 | 0.969 |
| 34 | 0.340909 | 0.759595 | 6.00 | 0.448804 | 0.669 |

Marginal Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | east | Fit | Resid | Std Resid |  |
| 2 | 43.000000 | 43.000000 | 0.000000 | \* | X |
| 5 | 43.000000 | 43.000000 | -0.000000 | -0.000002 | X |
| 14 | 42.000000 | 42.000000 | 0.000000 | \* | X |

*X  Unusual X*

Mixed Effects Model: west versus outside, near aloe, ... s1, near cactus

Method

|  |  |
| --- | --- |
| Variance estimation | Restricted maximum likelihood |
| DF for fixed effects | Kenward-Roger |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Random | 3 | 34, 35, 36 |
| near aloe | Fixed | 3 | 33, 34, 35 |
| near aloe1 | Fixed | 2 | 38, 39 |
| near cactus1 | Fixed | 3 | 38, 39, 40 |
| near cactus | Fixed | 4 | 32, 33, 34, 35 |

Variance Components

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Var | % of Total | SE Var | Z-Value | P-Value |
| outside | 0.000000 | 0.00% | \* | \* | \* |
| Error | 0.393939 | 100.00% | 0.227441 | 1.732051 | 0.042 |
| Total | 0.393939 |  |  |  |  |

*-2 Log likelihood = 25.161729*

Tests of Fixed Effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | DF Num | DF Den | F-Value | P-Value |
| near aloe | 2.00 | 6.00 | 2.08 | 0.206 |
| near aloe1 | 1.00 | 6.00 | 0.35 | 0.578 |
| near cactus1 | 2.00 | 6.00 | 0.67 | 0.548 |
| near cactus | 3.00 | 6.00 | 0.42 | 0.743 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-sq | R-sq(adj) |
| 0.627646 | 52.09% | 0.00% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | DF | T-Value | P-Value |
| Constant | 40.106061 | 0.300669 | 6.00 | 133.389204 | 0.000 |
| near aloe |  |  |  |  |  |
| 33 | 0.000000 | 0.443813 | 6.00 | 0.000000 | 1.000 |
| 34 | 0.909091 | 0.469941 | 6.00 | 1.934478 | 0.101 |
| near aloe1 |  |  |  |  |  |
| 38 | -0.136364 | 0.231774 | 6.00 | -0.588348 | 0.578 |
| near cactus1 |  |  |  |  |  |
| 38 | 0.121212 | 0.740024 | 6.00 | 0.163795 | 0.875 |
| 39 | -0.515152 | 0.611997 | 6.00 | -0.841754 | 0.432 |
| near cactus |  |  |  |  |  |
| 32 | 0.545455 | 0.615947 | 6.00 | 0.885555 | 0.410 |
| 33 | 0.090909 | 0.447579 | 6.00 | 0.203113 | 0.846 |
| 34 | -0.636364 | 0.601236 | 6.00 | -1.058427 | 0.331 |

Marginal Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | west | Fit | Resid | Std Resid |  |
| 2 | 40.000000 | 40.000000 | -0.000000 | \* | X |
| 5 | 40.000000 | 40.000000 | -0.000000 | -0.000006 | X |
| 14 | 40.000000 | 40.000000 | 0.000000 | \* | X |

*X  Unusual X*

Mixed Effects Model: north versus outside, near aloe, ... 1, near cactus

Method

|  |  |
| --- | --- |
| Variance estimation | Restricted maximum likelihood |
| DF for fixed effects | Kenward-Roger |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Random | 3 | 34, 35, 36 |
| near aloe | Fixed | 3 | 33, 34, 35 |
| near aloe1 | Fixed | 2 | 38, 39 |
| near cactus1 | Fixed | 3 | 38, 39, 40 |
| near cactus | Fixed | 4 | 32, 33, 34, 35 |

Variance Components

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Var | % of Total | SE Var | Z-Value | P-Value |
| outside | 0.000000 | 0.00% | \* | \* | \* |
| Error | 0.303030 | 100.00% | 0.174955 | 1.732051 | 0.042 |
| Total | 0.303030 |  |  |  |  |

*-2 Log likelihood = 23.587544*

Tests of Fixed Effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | DF Num | DF Den | F-Value | P-Value |
| near aloe | 2.00 | 6.00 | 0.93 | 0.446 |
| near aloe1 | 1.00 | 6.00 | 0.05 | 0.830 |
| near cactus1 | 2.00 | 6.00 | 2.12 | 0.201 |
| near cactus | 3.00 | 6.00 | 1.07 | 0.428 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-sq | R-sq(adj) |
| 0.550482 | 65.91% | 20.45% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | DF | T-Value | P-Value |
| Constant | 40.409091 | 0.263705 | 6.00 | 153.236220 | 0.000 |
| near aloe |  |  |  |  |  |
| 33 | 0.333333 | 0.389249 | 6.00 | 0.856349 | 0.425 |
| 34 | -0.303030 | 0.412166 | 6.00 | -0.735215 | 0.490 |
| near aloe1 |  |  |  |  |  |
| 38 | 0.045455 | 0.203279 | 6.00 | 0.223607 | 0.830 |
| near cactus1 |  |  |  |  |  |
| 38 | -1.151515 | 0.649044 | 6.00 | -1.774171 | 0.126 |
| 39 | 0.393939 | 0.536757 | 6.00 | 0.733925 | 0.491 |
| near cactus |  |  |  |  |  |
| 32 | 0.818182 | 0.540221 | 6.00 | 1.514531 | 0.181 |
| 33 | -0.363636 | 0.392553 | 6.00 | -0.926337 | 0.390 |
| 34 | -0.454545 | 0.527318 | 6.00 | -0.861994 | 0.422 |

Marginal Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | north | Fit | Resid | Std Resid |  |
| 2 | 40.000000 | 40.000000 | 0.000000 | \* | X |
| 5 | 42.000000 | 42.000000 | -0.000000 | -0.000003 | X |
| 14 | 40.000000 | 40.000000 | 0.000000 | \* | X |

*X  Unusual X*

Mixed Effects Model: south versus outside, near aloe, ... 1, near cactus

Method

|  |  |
| --- | --- |
| Variance estimation | Restricted maximum likelihood |
| DF for fixed effects | Kenward-Roger |

Factor Information

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Type | Levels | Values |
| outside | Random | 3 | 34, 35, 36 |
| near aloe | Fixed | 3 | 33, 34, 35 |
| near aloe1 | Fixed | 2 | 38, 39 |
| near cactus1 | Fixed | 3 | 38, 39, 40 |
| near cactus | Fixed | 4 | 32, 33, 34, 35 |

Variance Components

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Var | % of Total | SE Var | Z-Value | P-Value |
| outside | 0.362934 | 58.11% | 0.542839 | 0.668584 | 0.252 |
| Error | 0.261615 | 41.89% | 0.182010 | 1.437365 | 0.075 |
| Total | 0.624548 |  |  |  |  |

*-2 Log likelihood = 25.026394*

Tests of Fixed Effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Term | DF Num | DF Den | F-Value | P-Value |
| near aloe | 2.00 | 4.50 | 0.60 | 0.585 |
| near aloe1 | 1.00 | 4.25 | 1.47 | 0.289 |
| near cactus1 | 2.00 | 5.04 | 0.46 | 0.655 |
| near cactus | 3.00 | 4.77 | 0.08 | 0.967 |

Model Summary

|  |  |  |
| --- | --- | --- |
| S | R-sq | R-sq(adj) |
| 0.511483 | 75.17% | 42.06% |

Coefficients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Term | Coef | SE Coef | DF | T-Value | P-Value |
| Constant | 40.393656 | 0.528606 | 2.29 | 76.415445 | 0.000 |
| near aloe |  |  |  |  |  |
| 33 | 0.198785 | 0.392104 | 4.49 | 0.506971 | 0.636 |
| 34 | -0.357149 | 0.403370 | 4.36 | -0.885413 | 0.422 |
| near aloe1 |  |  |  |  |  |
| 38 | -0.237545 | 0.196011 | 4.25 | -1.211897 | 0.289 |
| near cactus1 |  |  |  |  |  |
| 38 | -0.846029 | 0.886003 | 5.73 | -0.954883 | 0.378 |
| 39 | 0.514358 | 0.605677 | 4.90 | 0.849227 | 0.435 |
| near cactus |  |  |  |  |  |
| 32 | -0.187871 | 0.626812 | 5.13 | -0.299724 | 0.776 |
| 33 | 0.090097 | 0.437857 | 4.94 | 0.205767 | 0.845 |
| 34 | -0.107027 | 0.514490 | 4.25 | -0.208025 | 0.845 |

Marginal Fits and Diagnostics for Unusual Observations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Obs | south | Fit | Resid | Std Resid |  |
| 2 | 41.000000 | 40.681383 | 0.318617 | 0.739944 | X |
| 5 | 41.000000 | 40.681383 | 0.318617 | 0.739944 | X |
| 14 | 40.000000 | 39.755665 | 0.244335 | 0.679704 | X |

*X  Unusual X*

ARIMA Model: east

**\* ERROR \* Model contains no autoregressive or moving average term**

Trend Analysis for near aloe

Method

|  |  |
| --- | --- |
| Model type | Linear Trend Model |
| Data | near aloe |
| Length | 15 |
| NMissing | 0 |

Fitted Trend Equation

|  |
| --- |
| Yt = 34.410 - 0.0429×t |

Accuracy Measures

|  |  |
| --- | --- |
| MAPE | 1.84264 |
| MAD | 0.62730 |
| MSD | 0.56127 |

Cluster Analysis of Observations: east, west, north, south

Euclidean Distance, Complete Linkage

Amalgamation Steps

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Step | Number of clusters | Similarity level | Distance level | Clusters joined | | New cluster | Number of obs. in new cluster |
| 1 | 14 | 100.000 | 0.00000 | 7 | 15 | 7 | 2 |
| 2 | 13 | 100.000 | 0.00000 | 2 | 13 | 2 | 2 |
| 3 | 12 | 100.000 | 0.00000 | 3 | 9 | 3 | 2 |
| 4 | 11 | 66.667 | 1.00000 | 8 | 14 | 8 | 2 |
| 5 | 10 | 66.667 | 1.00000 | 7 | 12 | 7 | 3 |
| 6 | 9 | 66.667 | 1.00000 | 4 | 10 | 4 | 2 |
| 7 | 8 | 66.667 | 1.00000 | 1 | 6 | 1 | 2 |
| 8 | 7 | 52.860 | 1.41421 | 7 | 11 | 7 | 4 |
| 9 | 6 | 52.860 | 1.41421 | 5 | 7 | 5 | 5 |
| 10 | 5 | 52.860 | 1.41421 | 3 | 5 | 3 | 7 |
| 11 | 4 | 42.265 | 1.73205 | 4 | 8 | 4 | 4 |
| 12 | 3 | 42.265 | 1.73205 | 1 | 4 | 1 | 6 |
| 13 | 2 | 33.333 | 2.00000 | 2 | 3 | 2 | 9 |
| 14 | 1 | 0.000 | 3.00000 | 1 | 2 | 1 | 15 |

Final Partition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Number of observations | Within cluster sum of squares | Average distance from centroid | Maximum distance from centroid |
| Cluster1 | 15 | 20.9333 | 1.13600 | 1.77138 |

|  |
| --- |
|  |
| “Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)” | International Commission on Non-ionizing Radiation Protection | 0 |
| “The Impulse UHF Field in Experimental and Clinical Practice” | ABRIKOSOV, I. A. | 1954 |
| “The Action of a Pulsed Electric UHF Field on the Organism” | ABRIKOSOV, I. A. | 1955 |
| “The role of coherence time in the effect of microwaves on ornithine decarboxylase activity” | Litovitz TA, Krause D, Penafiel M, Elson EC, Mullins JM | 1993 |
| “Opioid receptor subtypes that mediate a microwave-induced decrease” | inNL, Pal’tsev IuP, Iasnetsov VV | 1994 |
| “Effect of a magnetic field on carboxydismutase” | AKOYUNOGLOU, G. | 1964 |
| “Mortality of chicken embryos exposed to EMFs from mobile phones” | Youbicier-Simo BJ, Lebecq JC, Bastide M | 1998 |
| “Micronucleus induction after whole-body microwave irradiation of rats” | Trosic I, Busljeta I, Kasuba V, Rozgaj R | 2002 |
| “Study on health effects of the shortwave transmitter station of Schwarzenburg, Bern, Switzerland” | E.S. Altpeter, T.H. Krebs | 1995 |
| “The microwave syndrome—further aspects of a Spanish study, in: Proceedings of the Third InternationalWorkshop on Bioelectromagnetic Effects of Electromagnetic Fields, Kos, Greece” | G. Oberfeld, et al | 2004 |
| “Electromagnetic absorption in the human head and neck for mobile telephones at 835 and 1900 MHz, IEE Trans” | O.P. Gandhi, G. Lazzi, C.M. Furse |  |