Answer on Question #65062 – Math – Statistics and Probability

Question

There are 50 fields in a village, sown with wheat and each is divided into 8 plots of equal size. Out of the 50 fields, 5 are selected by SRSWOR method. Again from each selected field, 2 plots are chosen by SRSWOR method. The yield in kg/plot recorded is as given in the following table:

Selected Field - Plot-I - Plot-II
1 - 4·16 - 4·76
2 - 5· 40 - 3·52
3 - 4·12 - 3·73
4 - 4·38 - 5·67
5 - 5·31 - 2·59
Estimate the average yield of all the 50 plots.

Solution

Sample mean [1] is given by

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{10} x_i = 4.364,$$

Sample standard deviation [1] is given by

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{10}(x_i - \bar{x})^2} = 0.9514.$$

$95\%\ CI$ [2] is given by

$$95\%\ CI = \left(\bar{x} - t_{0.025,9}\frac{s}{\sqrt{n}},\ \bar{x} + t_{0.025,9}\frac{s}{\sqrt{n}}\right) =$$

$$= \left(4.364 - 2.262\frac{0.9514}{\sqrt{10}}, 4.364 - 2.262\frac{0.9514}{\sqrt{10}}\right) =$$

$$= (4.364 - 0.6826,\ 4.364 + 0.6826) = (3.6814,\ 5.0466).$$

We are 95% confident that true average yield of all 500 plots lies between 3.6814 and 5.0466 kg.

References:

[1] State, T. P. (2017). Sample means and variances. Retrieved February 7, 2017, from https://onlinecourses.science.psu.edu/stat414/node/66 .

[2] Confidence intervals. Retrieved February 7, 2017, from http://www.stat.yale.edu/Courses/1997-98/101/confint.htm.