

## CHAPTER V

### COMPARISON OF REGRESSION

#### 5.1 Introduction

Normally, engineer should take conclusions of the research task to increase efficiency of the process. Comparison of the analyzing method should be checked for its precision before the final conclusions. This research uses the means of linear regression analysis to predict yield and capacity of the granulated fertilizer process. An SPSS program was adopted for all process calculations.

Comparison of three cases of fertilizer granulation, the high liquid phase, the moderate liquid phase, and the low liquid phase fertilizer formulations are examined. The comparison compares between actual yield and estimated yield from linear regression model via SPSS, and the same method is also utilized in the case of capacity of fertilizer production too.

#### 5.2 Comparison of Estimation of Process Yield and Capacity by Regression Model

In this chapter, there are two means, used to explain the comparison of all results from the SPSS method in Chapter 4. First, the scattered plots between actual yield in y-axis and estimated yield in the x-axis. The same way will do with capacity and estimated capacity, showing the comparison results in (a) of Figure (5.1) to (5.21). Second, yield and estimated yield, represented by the y-axis were plotted against the number of in over all, tests in the x-axis, to state if the SPSS regressed, model approaches the actual situation or not. Both capacity and estimated capacity were treated with the same procedures too. These results are expressed in (b) of Figure (5.1) to (5.21). The validity of results is acceptable and details are shown as follows.

##### 5.2.1 Comparison of the Regression Analysis Estimation of the Process Yield and Capacity of the High Liquid Phase Fertilizer Formulation

Those in Figure (a) of (5.1) to (5.4) show that comparison of SPSS regression estimation was acceptable for prediction of yield and capacity, but the details, observing from Figure (5.1b) to (5.4b), show that estimated yield and capacity characteristics try to predict all actual yield and capacity by roughly position not exactly.

### 5.2.2 Comparison of the Regression Analysis Estimation of the Process Yield and Capacity of the Moderate Liquid Phase Fertilizer Formulations

There are three fertilizer formulations, the 16-16-8, 13-13-21 and 15-15-15. No good comparison results for both yield and capacity were obtained via the SPSS regression estimation for the moderate liquid phase fertilizer cases. As shown in (a) of Figure (5.5) to (5.14).

(b) in Figure (5.5) to (5.14) show acceptable predictions with most of the results in the range of  $\pm 10\%$  error, but it is described in Chapter 4. The indecisive prediction of yield and capacity of the moderate liquid phase fertilizer via SPSS regression estimation was not considered.

### 5.2.3 Comparison of the Regression Analysis Estimation of Process Yield and Capacity of Low Liquid Phase Fertilizer Formulations

These results, the best obvious predictions of SPSS regression estimations, are shown in (a) of Figure (5.15) to (5.21). Most of the Figures for the 16-8-8 and 15-7-18 fertilizer formulations draw engineer in R&D research team to feasibility of process modification to decrease the raw material cost with the adjustment of nitrogen source from ammonia gas in the reactor or from ammonium sulfate solid as well as the world market cost.

More over, (b) of Figure (5.15) to (5.21) shows the comparison of both yield and capacity of the estimation is approved and the estimated results stay mostly exact for the average yield and capacity, respectively.

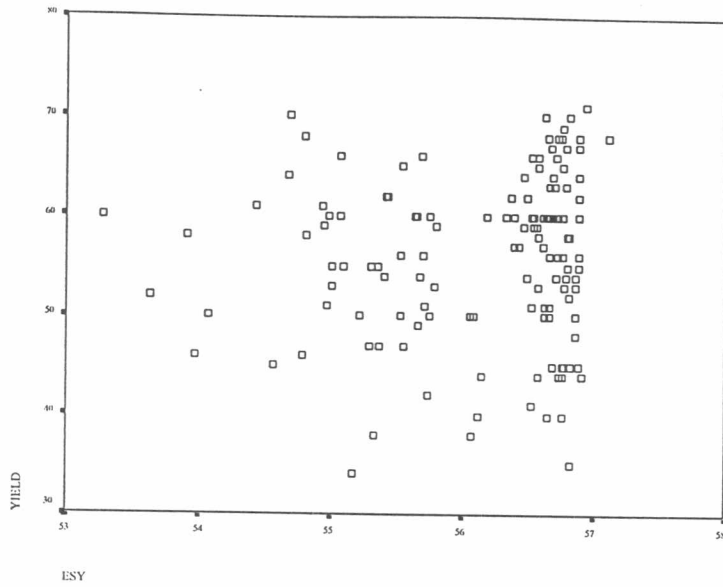


Figure (5.1a) Yield VS Estimated Yield of 16-20-0 (June)

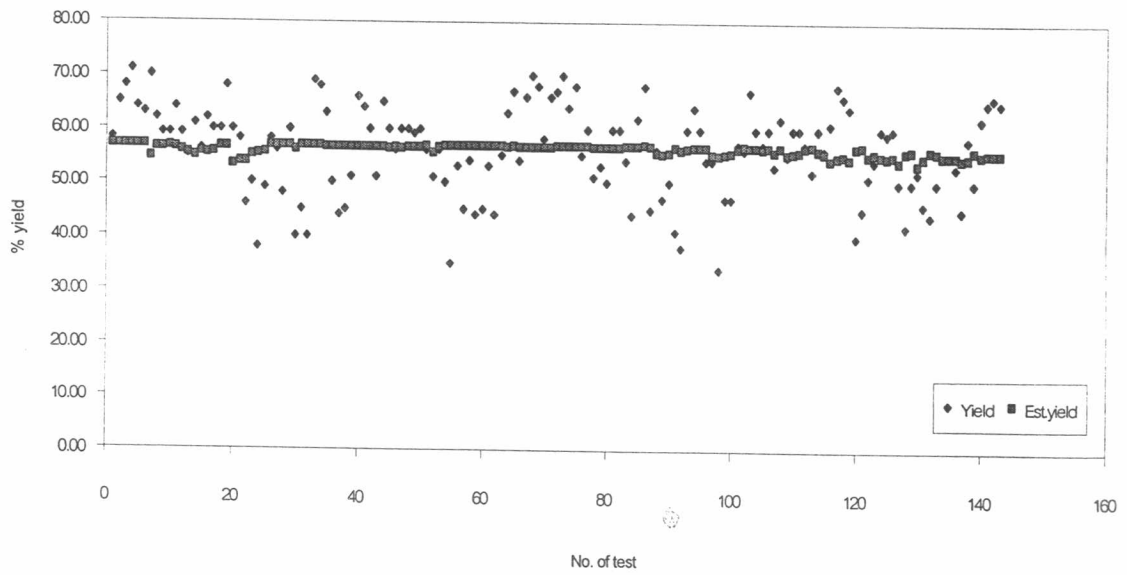


Figure (5.1b) Yield and Estimated Yield VS No. of Test of 16-20-0 (June)

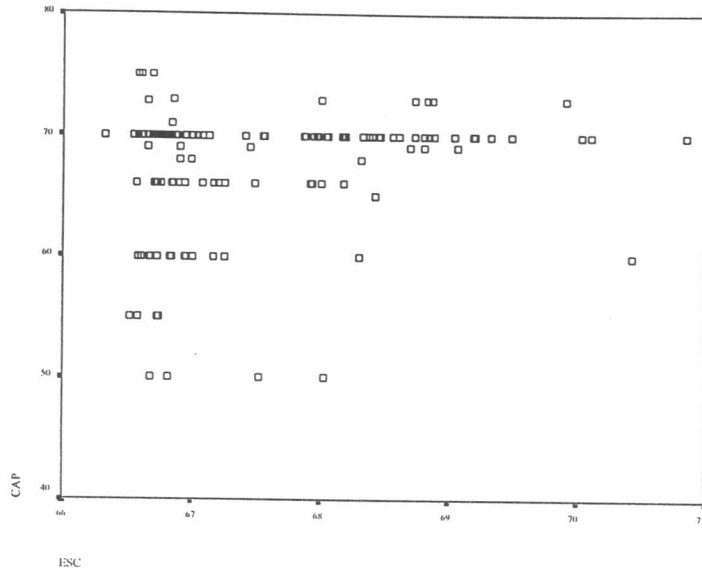


Figure (5.2a) Capacity VS Estimated Capacity of 16-20-0 (June)

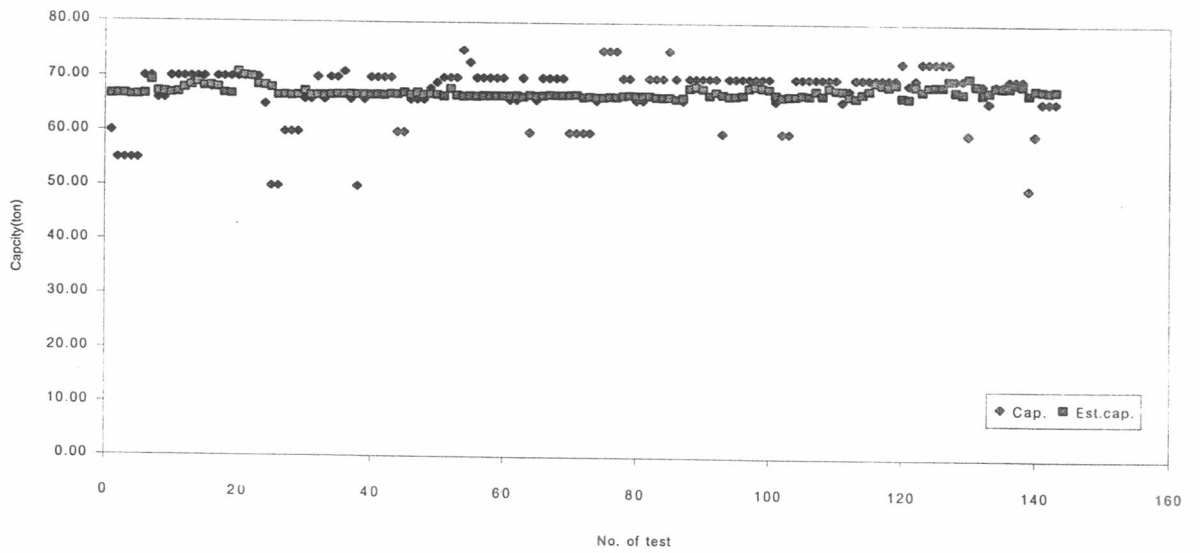


Figure (5.2b) Capacity and Estimated Capacity VS No. of Test 16-20-0 (June)

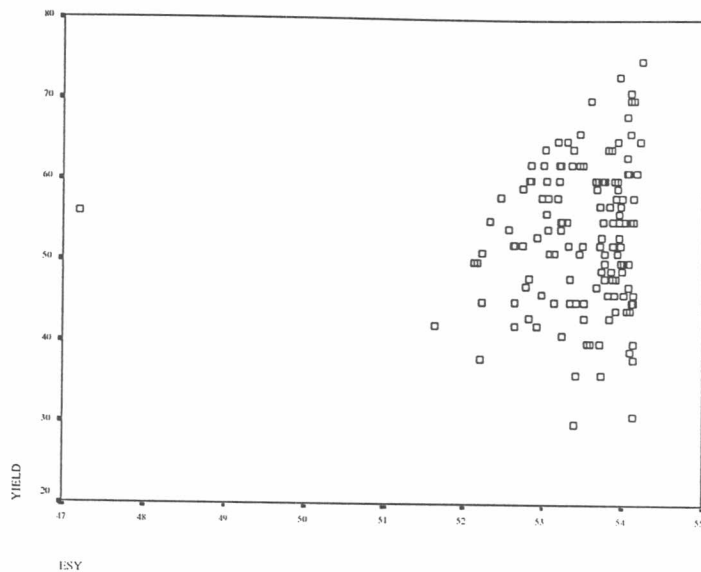


Figure (5.3a) Yield VS Estimated Yield of 16-20-0 (July)

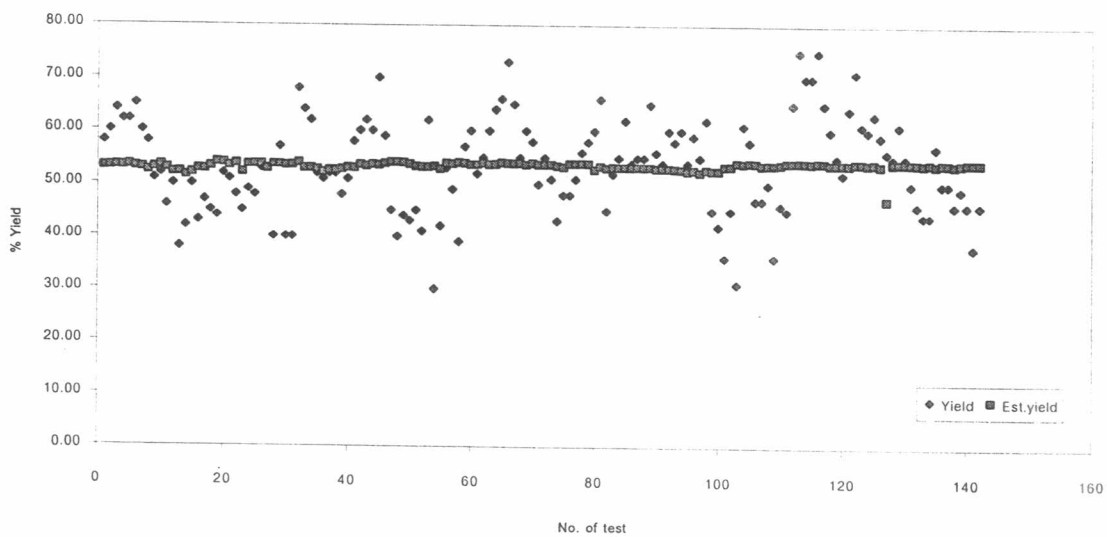


Figure (5.3b) Yield and Estimated Yield VS No. of Test of 16-20-0 (July)

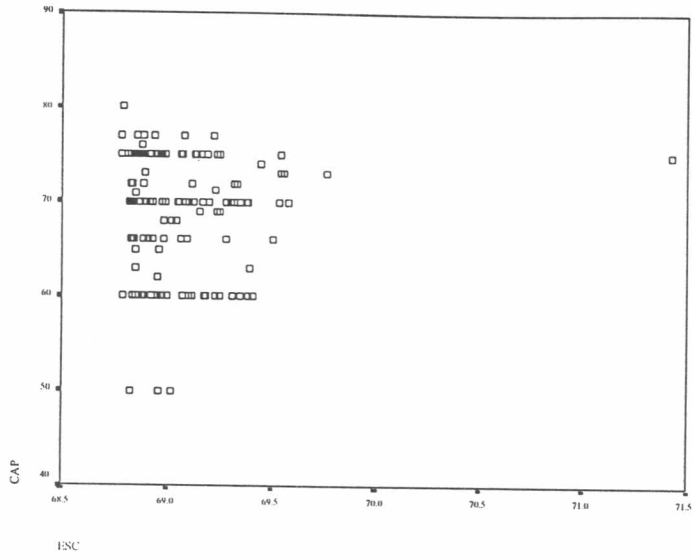


Figure (5.4a) Capacity VS Estimated Capacity of 16-20-0 (July)

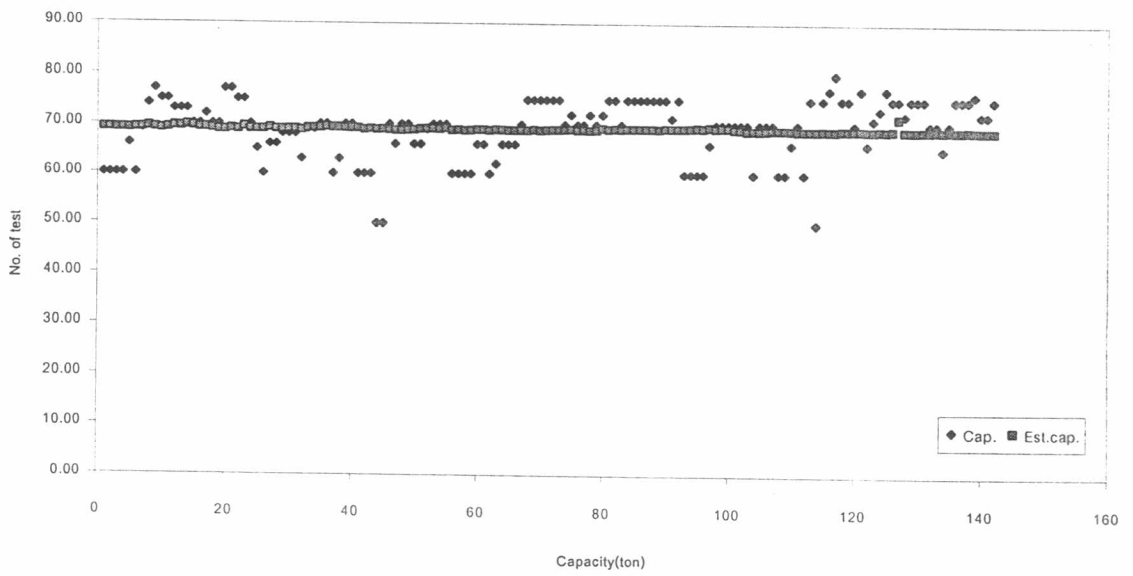


Figure (5.4b) Capacity and Estimated Capacity VS No. of Test 16-20-0 (July)

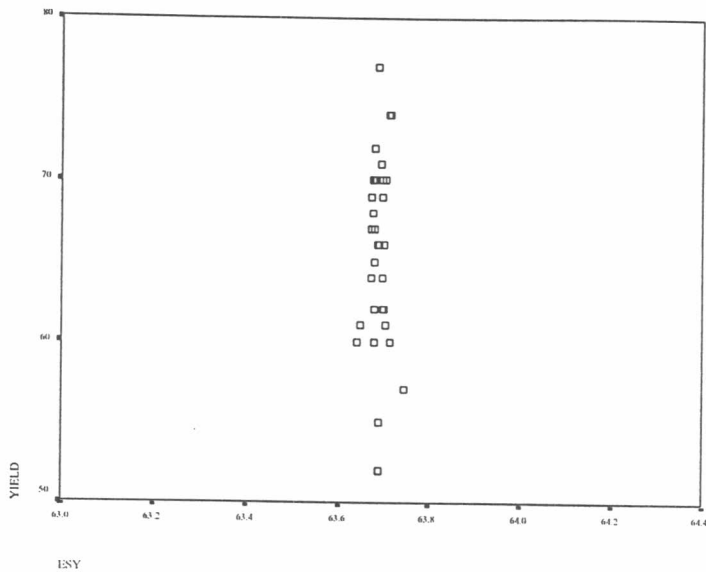


Figure (5.5a) Yield VS Estimated Yield of 16-16-8 (April)

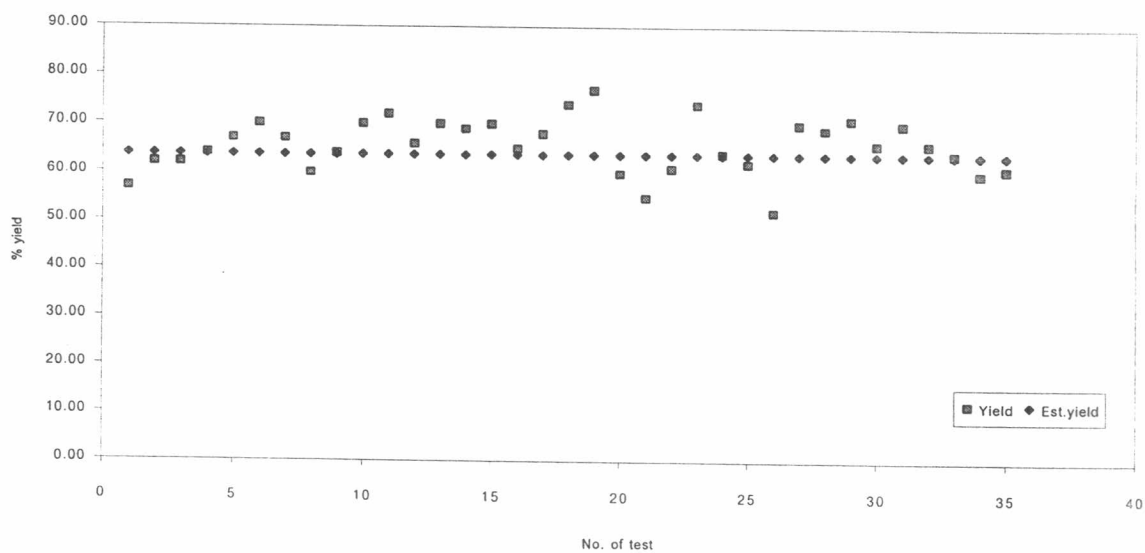


Figure (5.5b) Yield and Estimated Yield VS No. of Test of 16-16-8 (April)

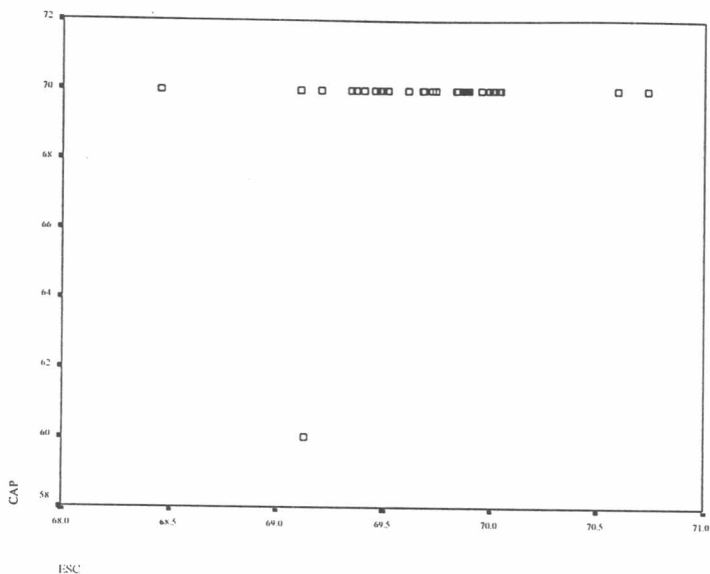


Figure (5.6a) Capacity VS Estimated Capacity of 16-16-8 (April)

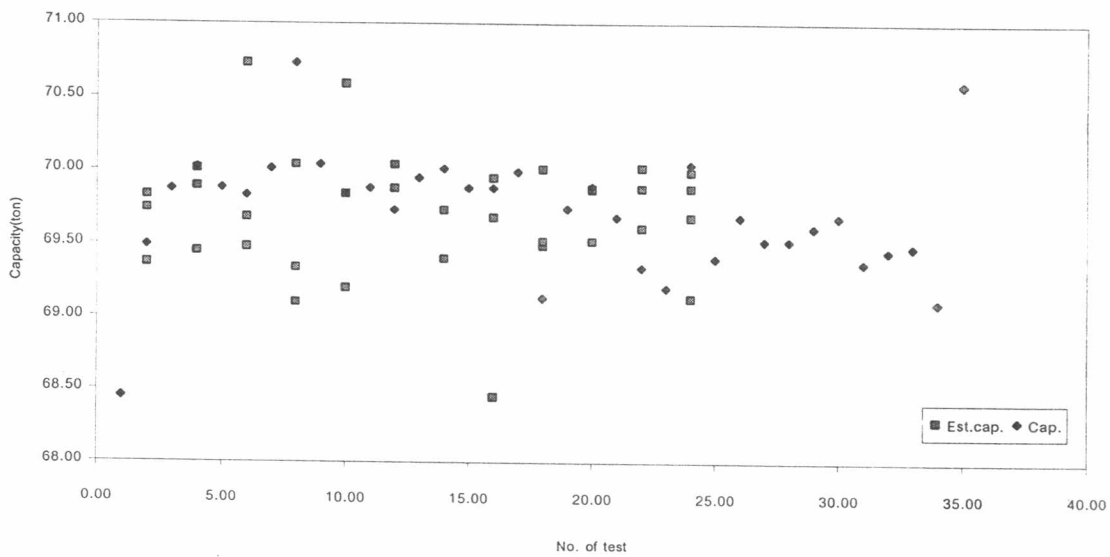


Figure (5.6b) Capacity and Estimated Capacity VS No. of Test of 16-16-8 (April)



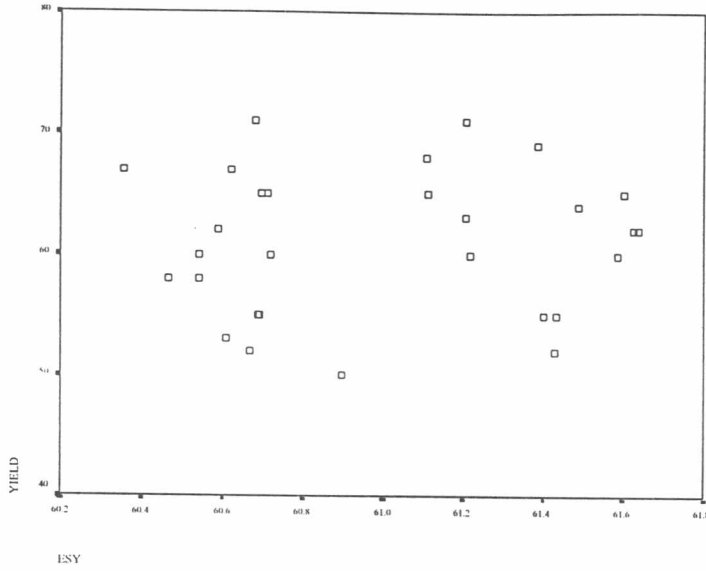


Figure (5.7a) Yield VS Estimated Yield of 16-16-8 (September)

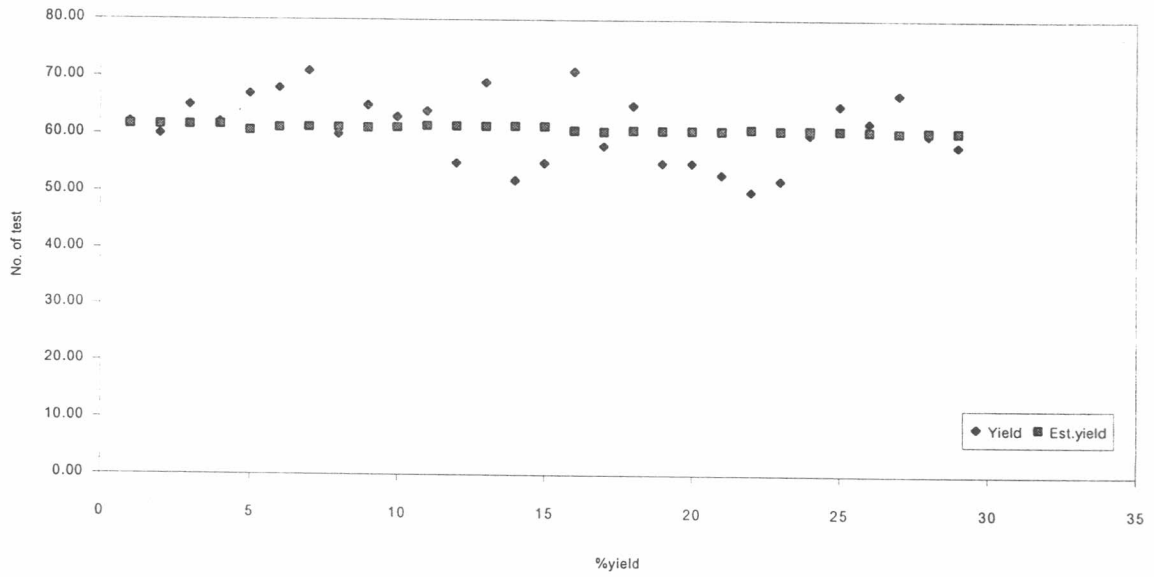


Figure (5.7b) Yield and Estimated Yield VS No. of Test of 16-16-8 (September)

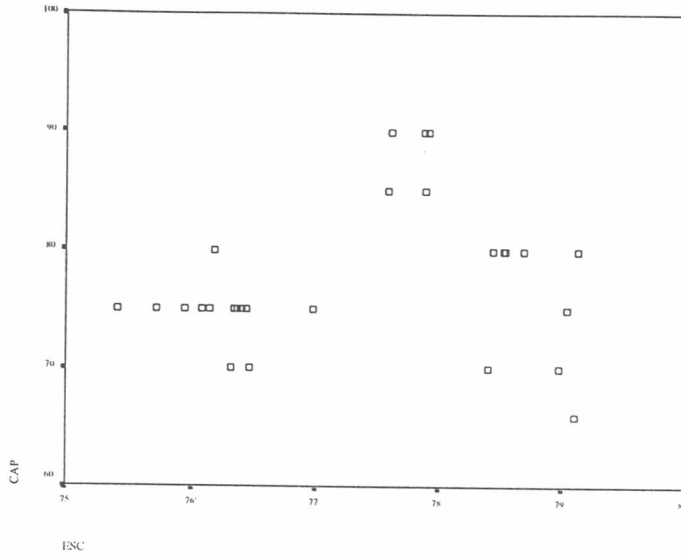


Figure (5.8a) Capacity and Estimated Capacity of 16-16-8 (September)

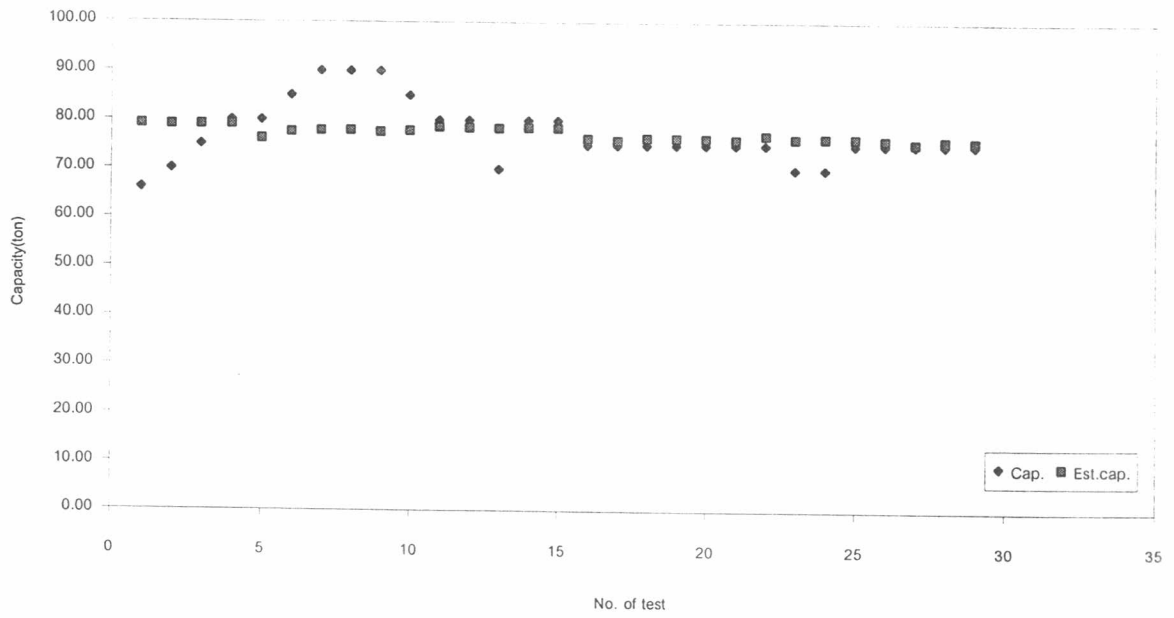


Figure (5.8b) Capacity and Estimated Capacity VS No. of Test of 16-16-8 (September)

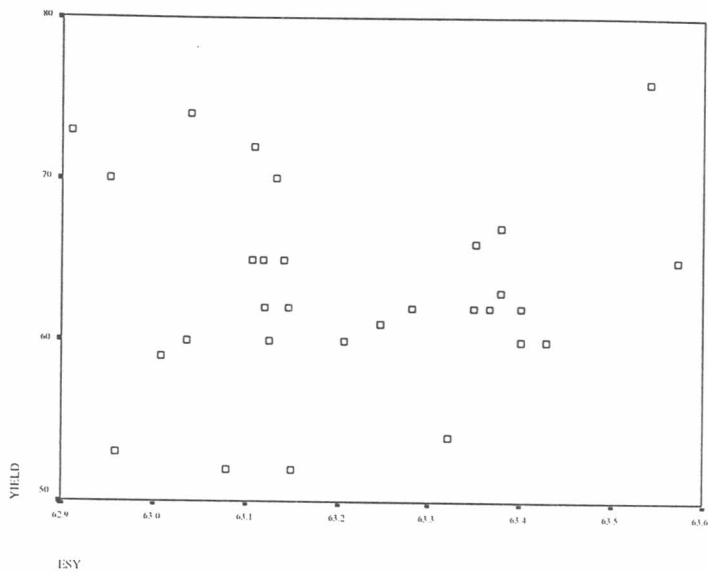


Figure (5.9a) Yield VS Estimated Yield of 13-13-21 (April)

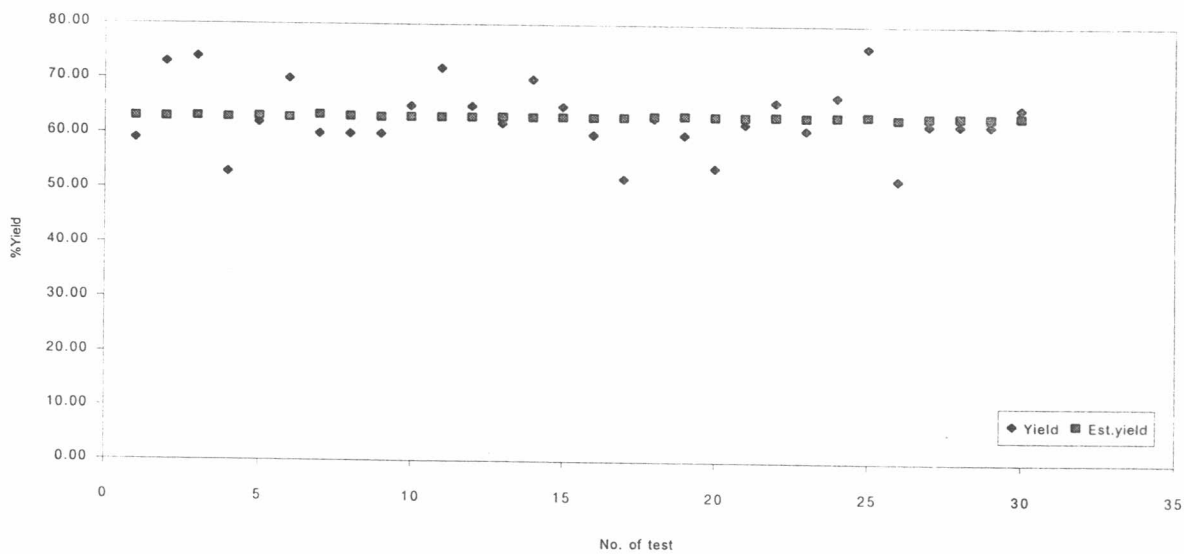


Figure (5.9b) Yield and Estimated Yield VS No. of Test of 13-13-21 (April)

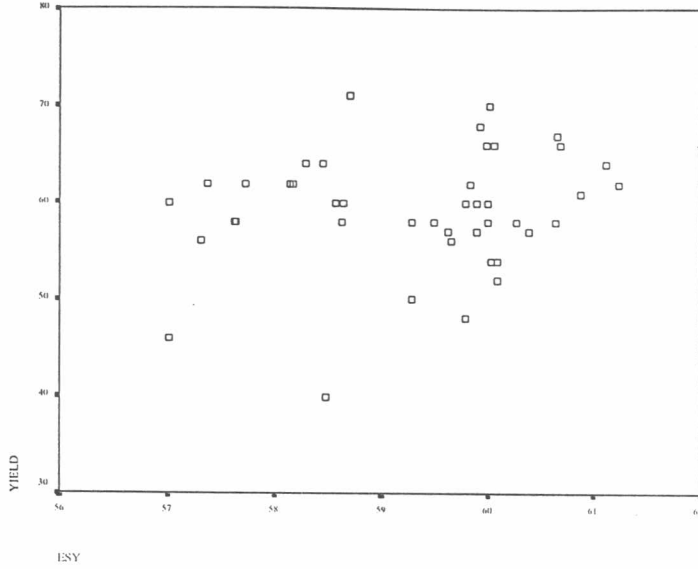


Figure (5.10a) Yield VS Estimated Yield of 15-15-15 (May)

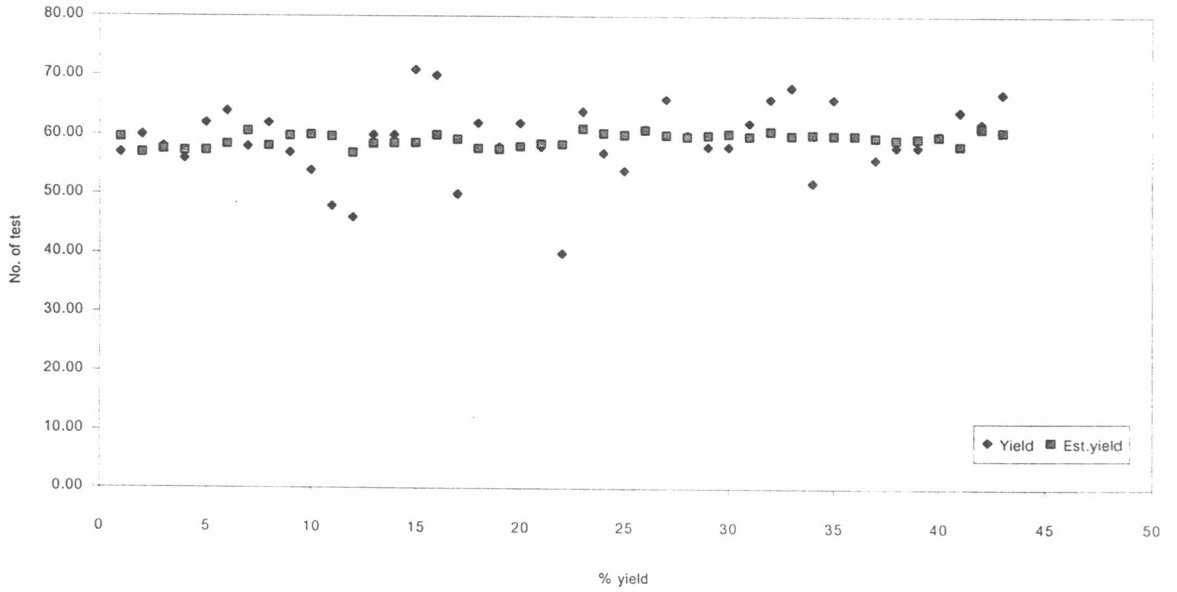


Figure (5.10b) Yield and Estimated Yield VS No. of Test of 15-15-15 (May)

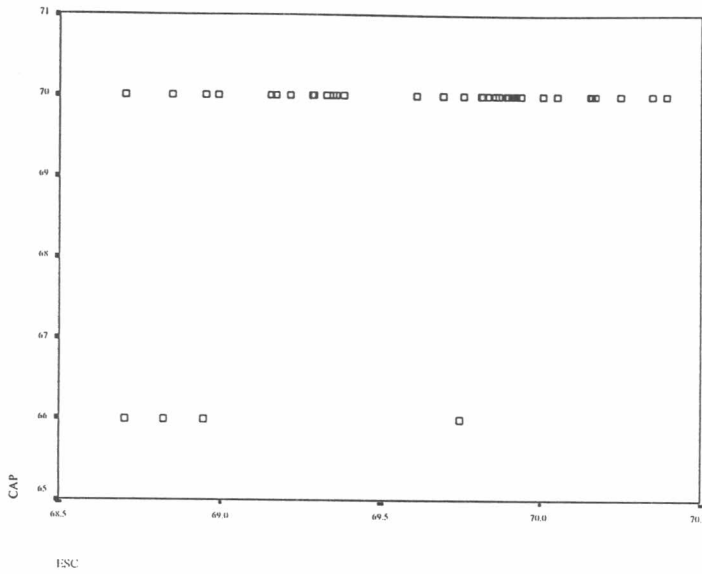


Figure (5.11a) Capacity VS Estimated Capacity of 15-15-15 (May)

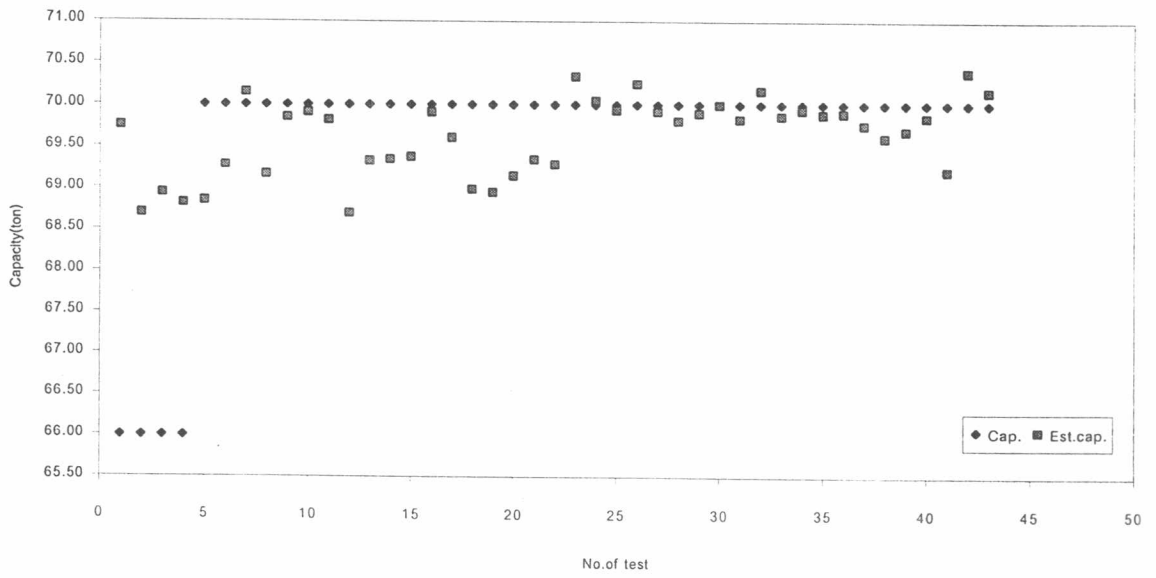


Figure (5.11b) Capacity and Estimated Capacity VS No. of Test of 15-15-15 (May)

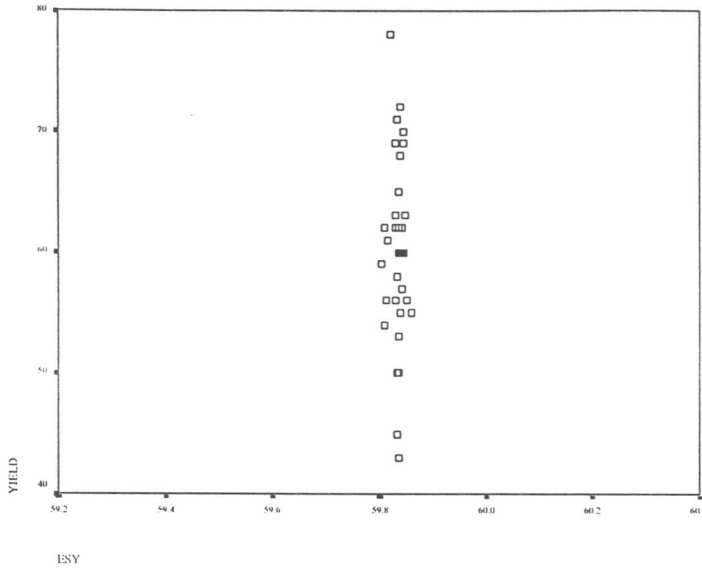


Figure (5.12a) Yield VS Estimated Yield of 15-15-15 (August)

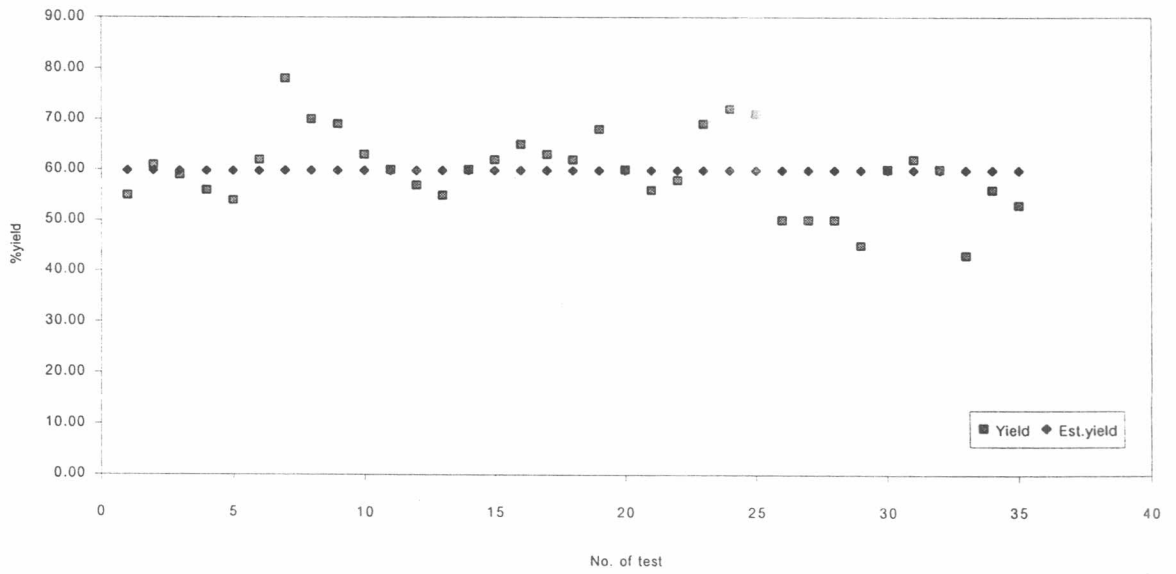


Figure (5.12b) Yield and Estimated Yield VS No. of Test of 15-15-15 (August)

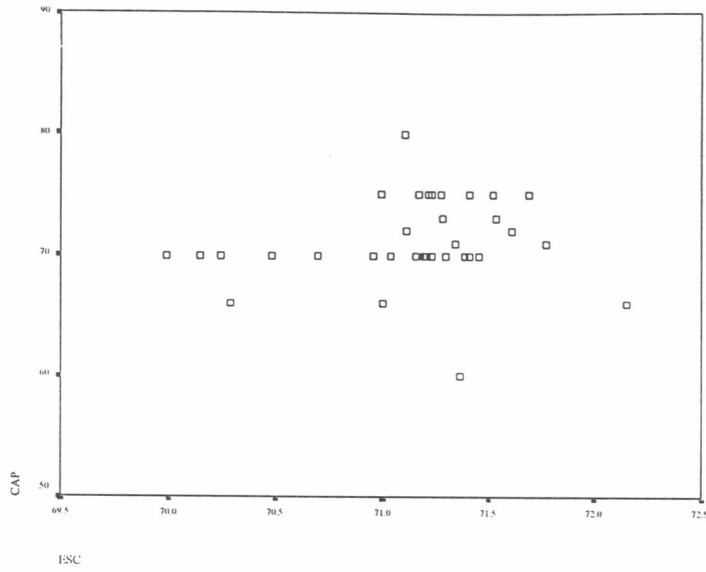


Figure (5.13a) Capacity and Estimated Capacity of 15-15-15 (August)

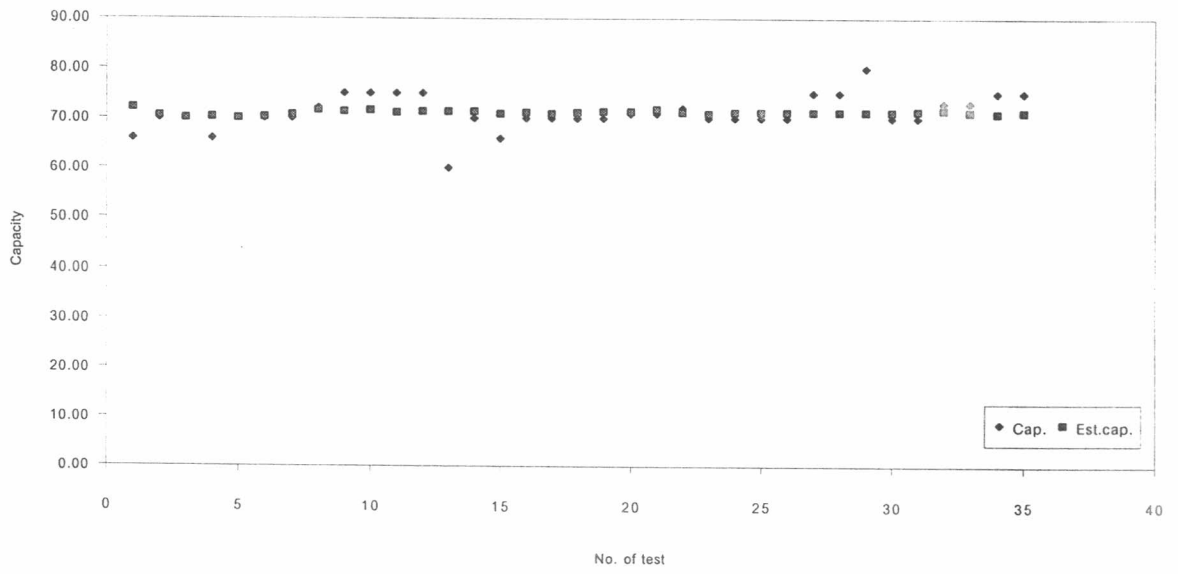


Figure (5.13b) Capacity and Estimated Capacity VS No. of Test of 15-15-15 (August)

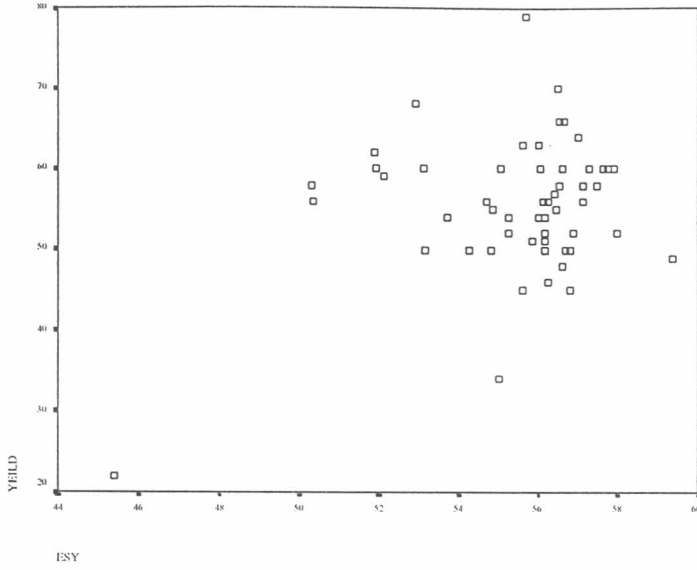


Figure (5.14a) Yield VS Estimated Yield of 16-8-8 (January)

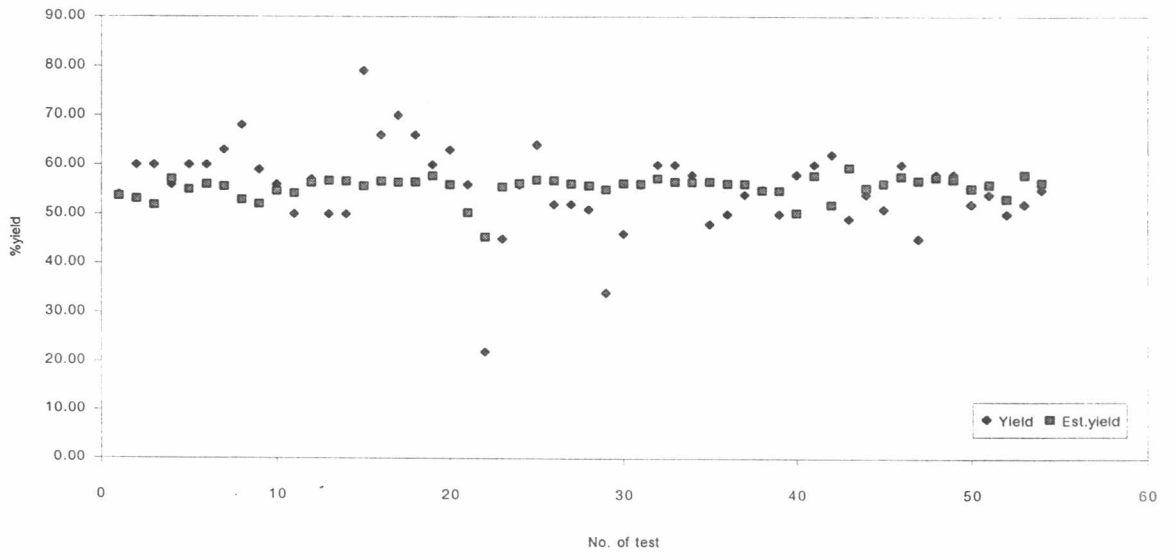


Figure (5.14b) Yield and Estimated Yield VS No. of Test of 16-8-8 (January)



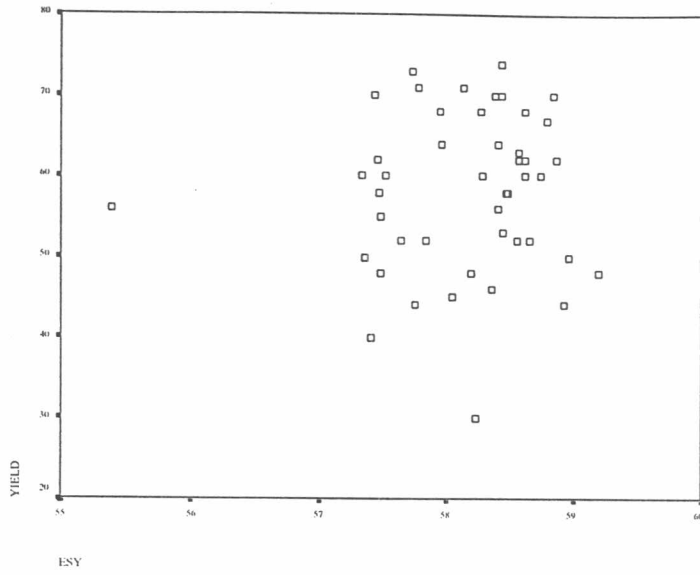


Figure (5.15a) Yield VS Estimated Yield of 16-8-8 (April)

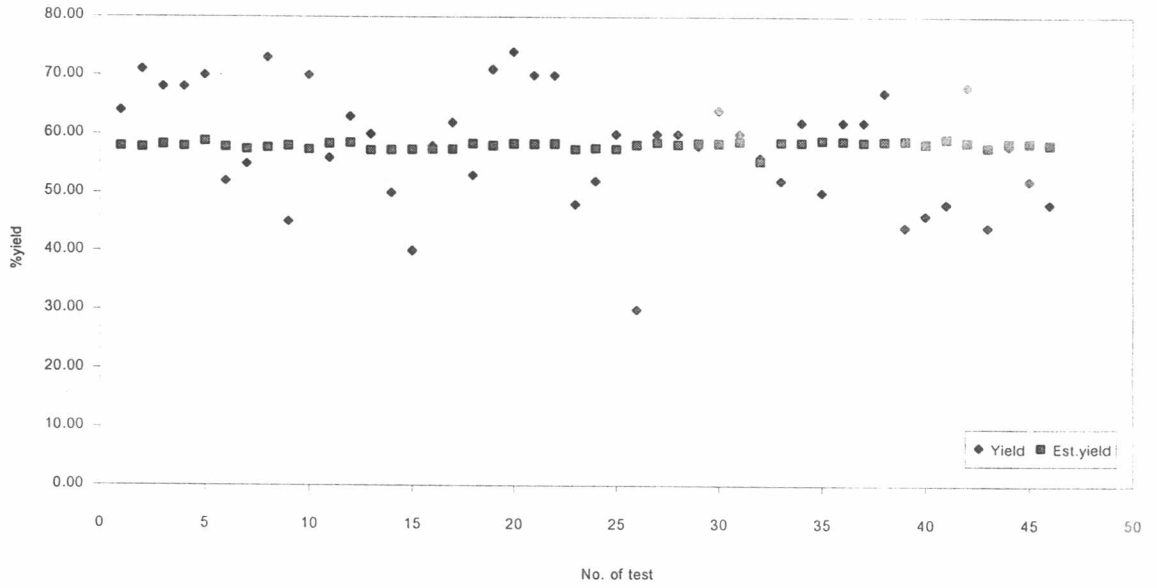


Figure (5.15b) Yield and Estimated Yield VS No. of Test of 16-8-8 (April)

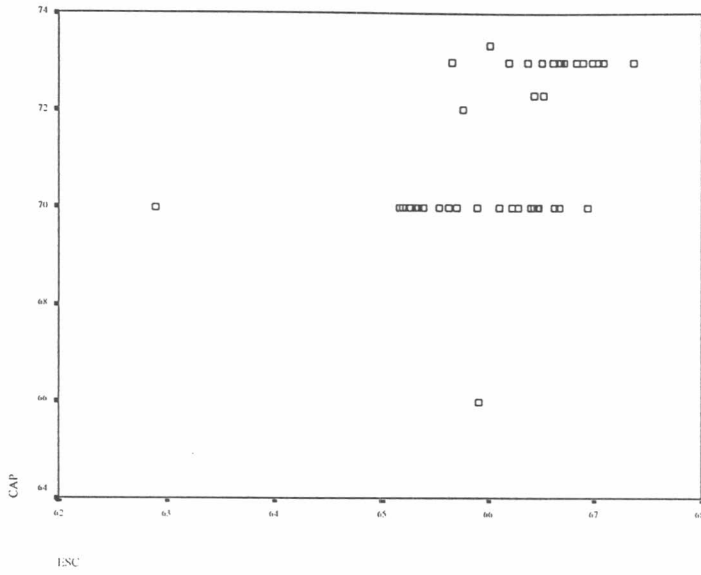


Figure (5.16a) Capacity VS Estimated Capacity of 16-8-8 (April)

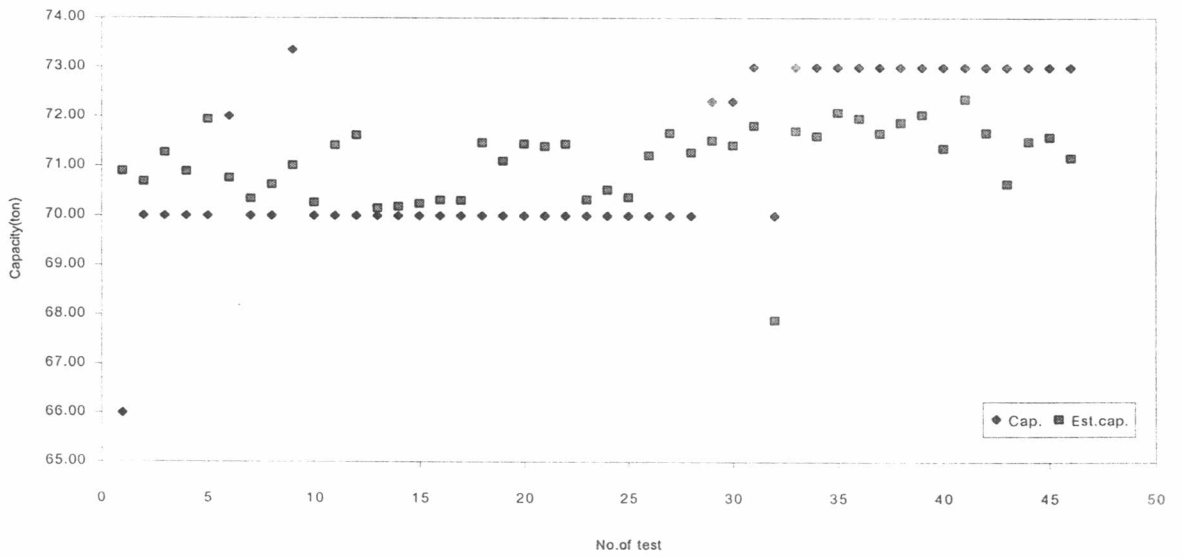


Figure (5.16b) Capacity and Estimated Capacity VS No. of Test of 16-8-8 (April)

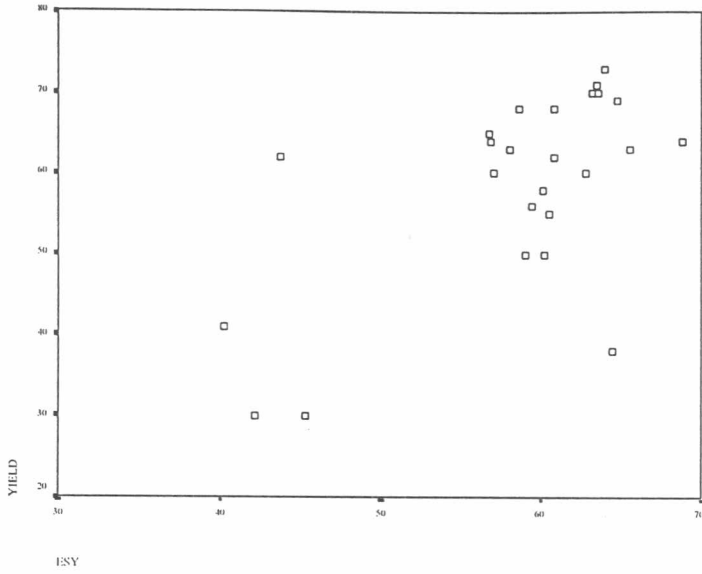


Figure (5.17a) Yield VS Estimated Yield of 16-8-8 (July)

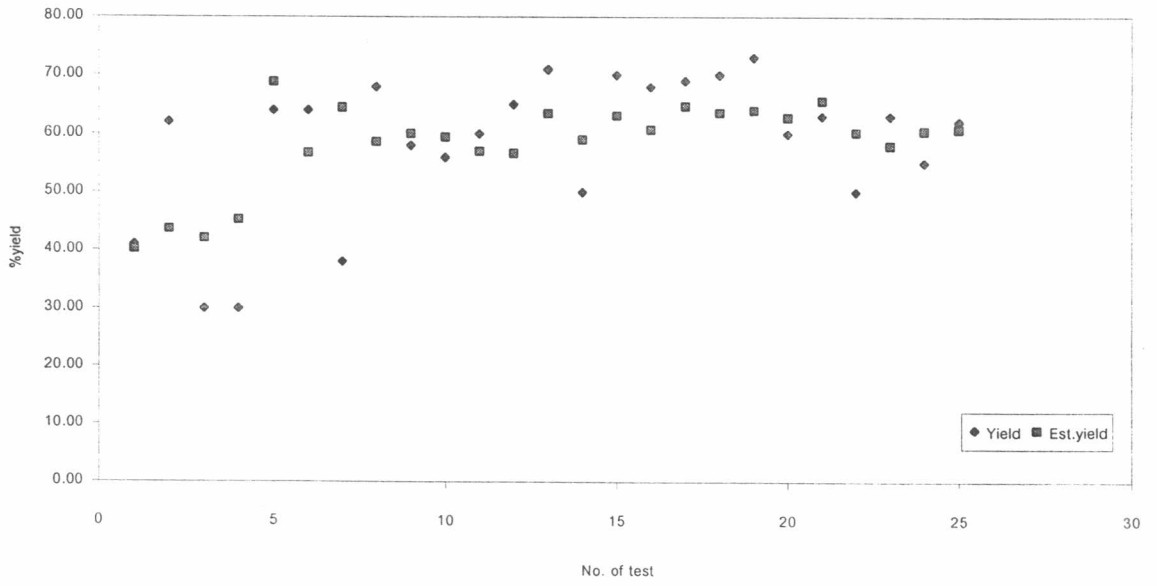


Figure (5.17b) Yield and Estimated Yield VS No. of Test of 16-8-8 (July)

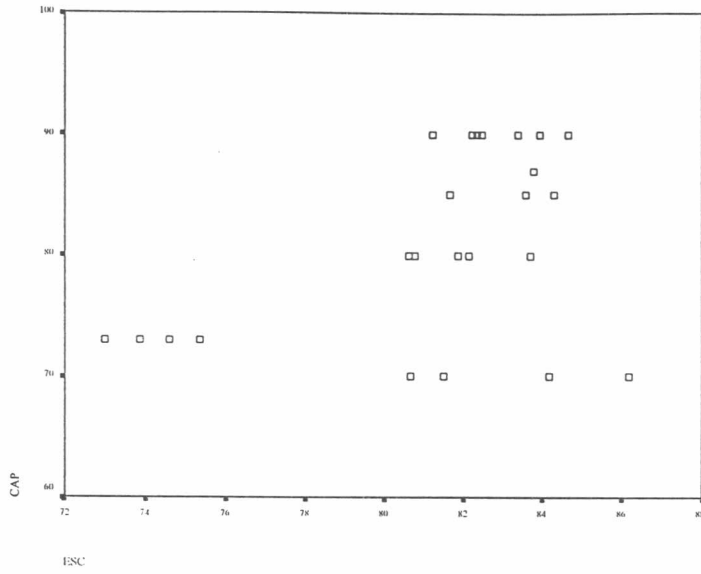


Figure (5.18a) Capacity and Estimated Capacity of 16-8-8 (July)

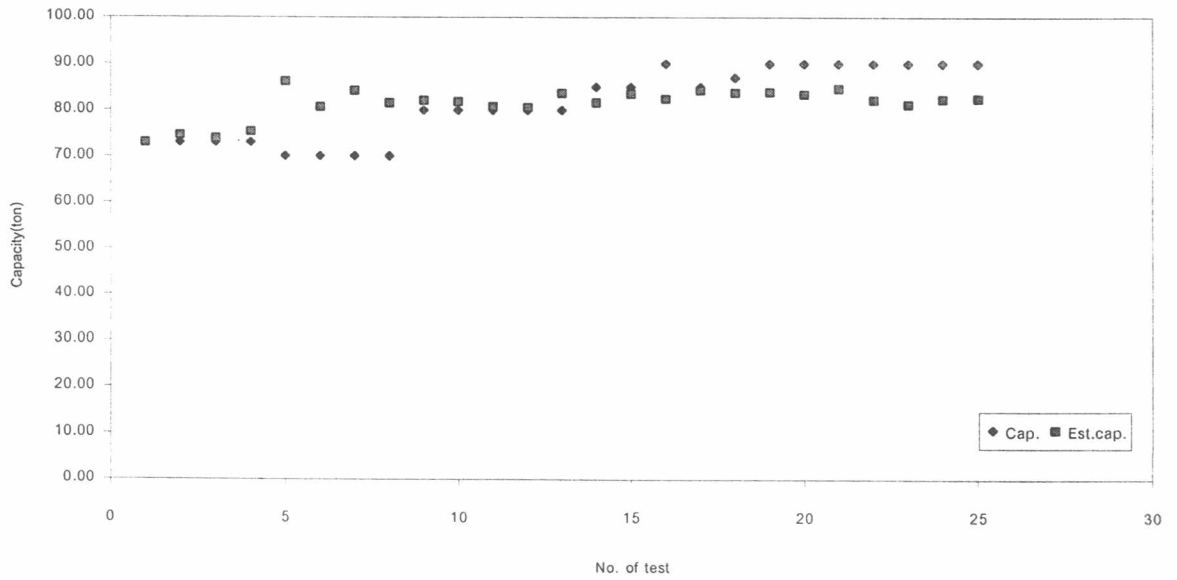


Figure (5.18b) Capacity and Estimated Capacity VS No. of Test of 16-8-8 (July)

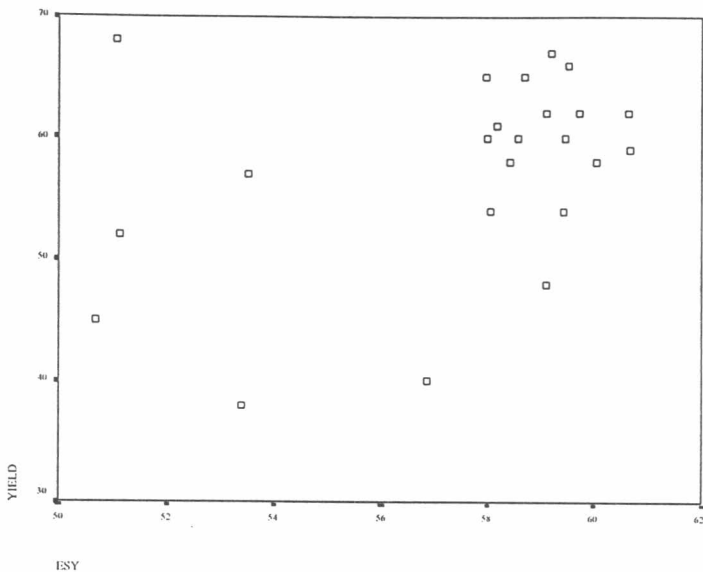


Figure (5.19a) Yield VS Estimated Yield of 15-7-18 (April)

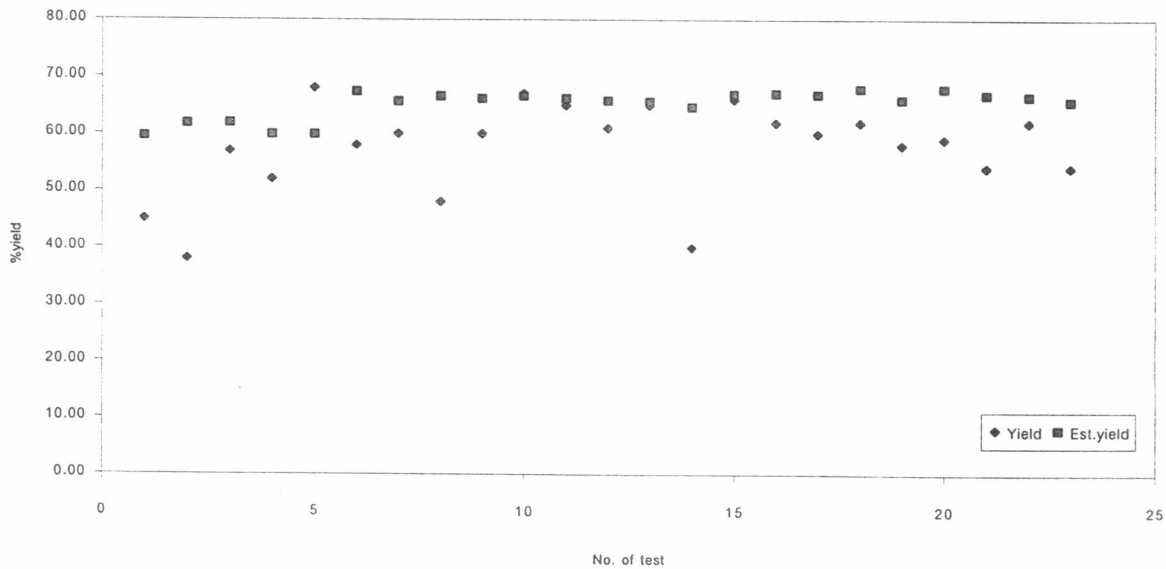


Figure (5.19b) Yield and Estimated Yield VS No. of Test of 15-7-18 (April)

