Physical and Economic Optimum for single input

Let y = f(x) be a response function. Here x stands for the input that is kgs of fertilizer applied per hectare and y the corresponding output that is kgs of yield per hectare.

We know that the maximum is only when $\frac{dy}{dx} = 0$ and $\frac{d^2y}{dx^2} < 0$.

This optimum is called physical optimum. We are not considering the profit with respect to the investment, we are interested only in maximizing the profit.

Economic optimum

The optimum which takes into consideration the amount invested and returns is called the economic optimum.

$$\frac{dy}{dx} = \frac{P_x}{P_y}$$

where $P_x \rightarrow$ stands for the per unit price of input that is price of fertilizer per kgs.

$P_y \rightarrow$ stands for the per unit price of output that is price of yield per kgs.