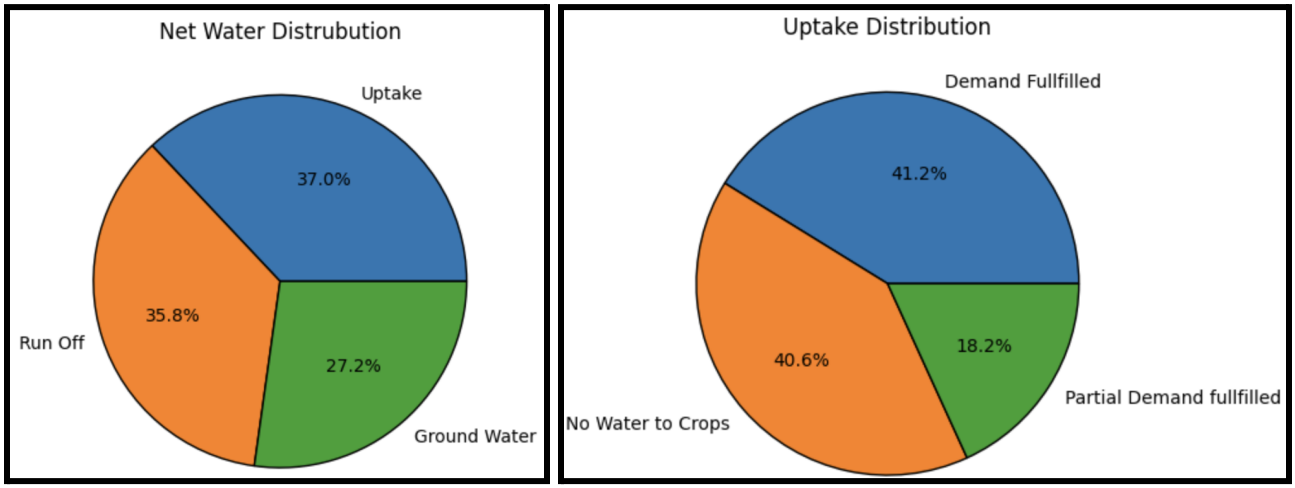
Pro Space 2023

VIPIN SINGH (19D070069)
Electrical Engineering Department (Dual Degree - Fifth Year) (2024 Batch)

PoCRA assignment - Mini Simulator for point wise daily soil water balance

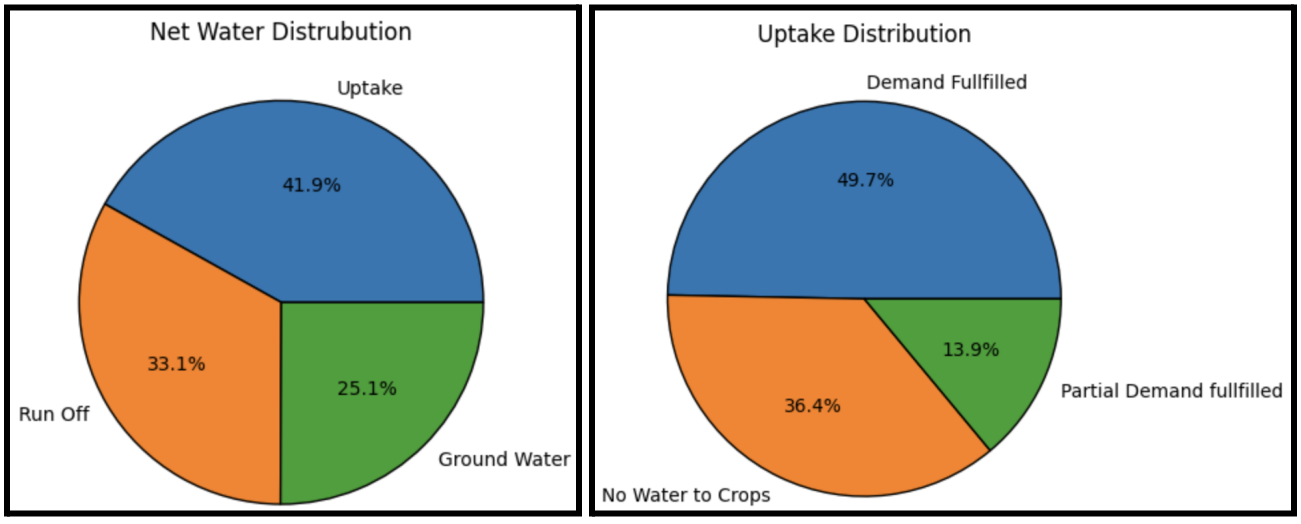
Shallow Soil Type



In the graph above and left it can be seen that of the total rainwater 37% is used by the plants, 35.8% of rain water is lost as runoff and 27.2% is percolated in ground water.

On 41.2% of Days crops met their water requirement, on 40.6% days crops got zero amount of water and on 18.2% of days crops got some water but not sufficient to meet their demands.

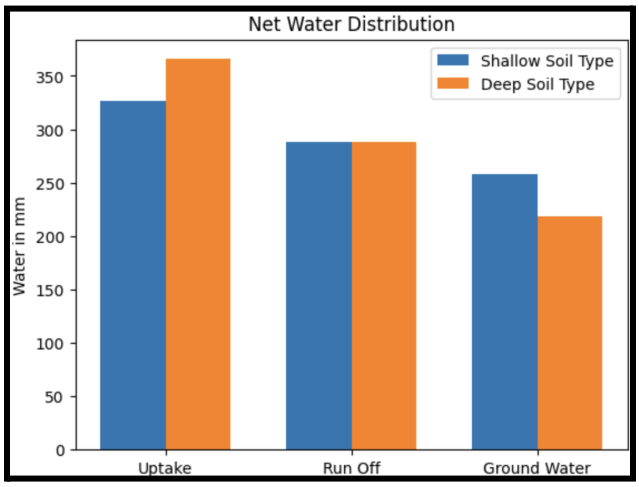
Deep Soil Type

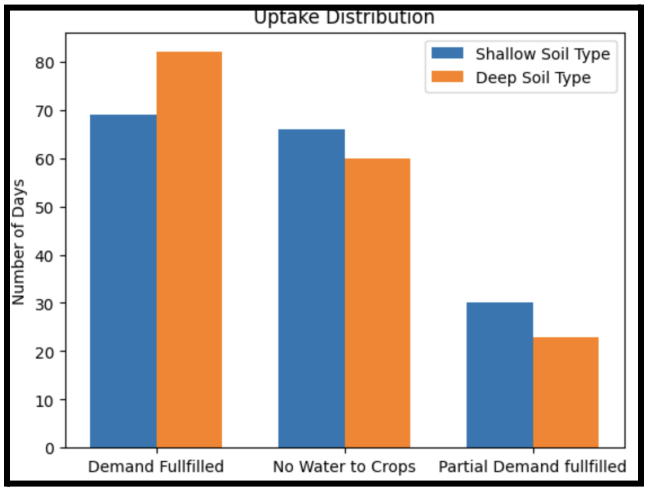


In the graph above and left it can be seen that of the total rain water 41.9% is used by the plants, 33.1% of rain water is lost as runoff and 25.1% is percolated in ground water.

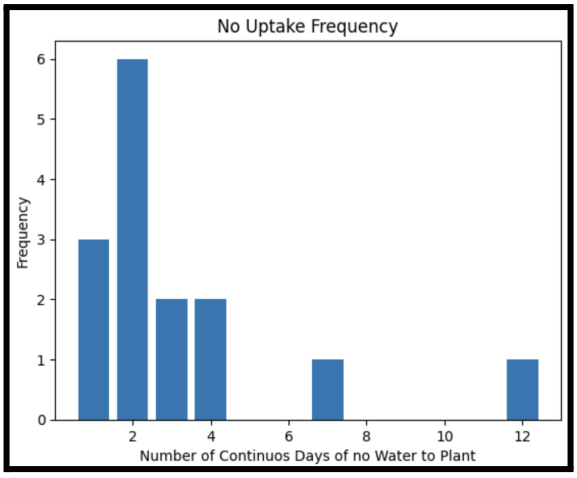
On 49.7% of Days crops met their water requirement, on 36.4% days crops got zero amount of water and on 13.9% of days crops got some water but not sufficient to meet their demands.

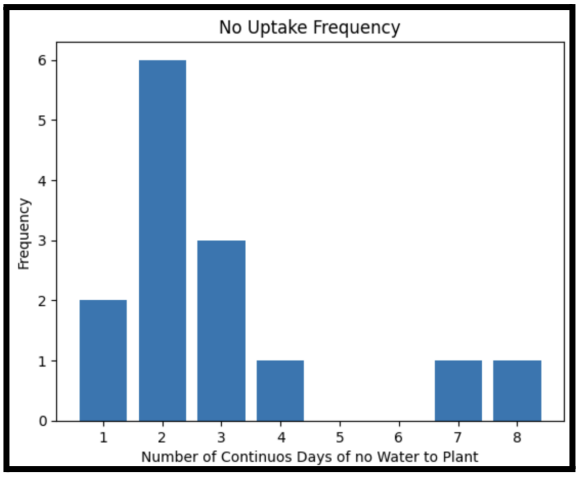
Shallow v/s Deep Soil Type





In the figure above and left, the runoff is the same for both soil types (Consistent with my assumption in the model). Deep Soil type has more water available for Uptake as compared to Shallow soil type for the given rain pattern.
In the figure above and right, the deep soil type fulfills the crops' needs on more days as compared to shallow soil type.





Also the average number of days with no uptake of water by crop is more spread for Shallow Soil (left) as compared to deep soil (right). This can be the reason for crop failure.

Therefore, I conclude that Deep Soil Type is better than Shallow Soil Type for selected model assumption and soil type.

ASSUMPTION IN THE MODEL:

1. At the End of Day 0 no Soil Moisture
2. On the day if rail fall happens it happens in the start
3. Then we calculate the runoff and infiltration (Infiltration + SM(n-1)> C: excess goes to runoff).
4. Than the plant takes the maximum water it can take (min(SM, Max Uptake))
5. Than of the remaining SM, Gamma/(1+Gamma) goes to Ground water