Q4

As the question mentioned, each square has n^2 trees and total $16n^2$ trees in orchard. And we already have a map with the number of apples on each tree.

First, assume we have a Sum Matrix which $sum[i][j]$ equals to the sum of apples from left top$(0,0)$ to right bottom (i,j) trees which called 2-dimension prefix sum. We can use 2 *for* loops to handle this in $O(n^2)$.

Then, we have $(3n-1)^2$ possible squares and for each square we compute the number of apples in this square by $sum[i][j] - sum[i-n][j] - sum[i][j-n] + sum[i-n][j-n]$ in $O(n^2)$.

Finally, we can find the square contains the largest number of apples in $O(n^2) + O(n^2) = O(n^2)$.