

Development of a vertical fertilization applicator for fruit orchard¹

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summary

The objective of this study was to develop a machine which could screw out a cavity and the soil mixed with the required fertilizers completely and send back the fertilized soil into the original cavity with advantages of deep tillage, deep turning and deep placement of fertilizers, inducing root extension to deep soil layers and promoting fertilization efficiency on the fruit orchard.

The vertical fertilization applicator was driven by the tractor or a mini-excavator. The applicator consisted of screw auger, iron cylinder, soil collective container, fertilizer box, hydraulic pump, hydraulic motor and frame. The principle of operation was to utilize the P.T.O of a tractor or the engine of a excavator to make the hydraulic pump start and generate high pressure oil passing through the totameter valve to the hydraulic motor, and turn the earth screw auger clockwise. The periphery of the earth screw auger that could screw out a cavity with 20 cm in diameter and adjustable depth with 60 cm deep at the most was equipped with an iron cylinder which enabled the digging out soil to screw up into soil collective container connected with the iron cylinder at its top, The soil was mixed completely with the fertilizers by turning the earth screw auger. The fertilized soil was sent back into the original cavity by turning the earth screw auger anti-clockwise. The fertilization axle installed at the bottom of the fertilizer box was rotated by a DC 12 V motor, and the fertilizers were forced to drop out into the soil collective container. A set of timer and touch-and-go switch was installed to adjust the rotation time with which the required amount of fertilizers was controlled. The digging speed of the earth screw auger by the hydraulics was 2 cm / sec. It was about 2 minutes to carry out a cavity, including screwing out a cavity, mixing fertilizers and sending back the fertilized soil.

It is advisable to apply the rates and kinds of fertilizers based on the results of soil test and plant analysis at the root hair zone stretched a little outward under the canopy of a fruit tree and to screw out 4-8 cavities per tree at the late dormancy stage or after the harvest time depending on the kinds of fruit trees.

(Key words : Fruit, Vertical fertilization applicator)

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