# ABSTRACT

Potato is one of the most important crops that is widely used as food stuff allover the world. In the last few years, the importance of potato crop, which suits sandy soil, was increased in Egypt in the newly reclaimed lands in Nubaria and Salhia.

Mechanization of production becomes one of the most essential tools for rising potato production and minimizing the production cost. New methods help in irrigation, sprinkler and drip irrigation water management and the potato planter development.

An Automatic potato planter has been developed. It is a two row automatic planter it is capable for establishing different ridge shapes with two rows. The inter row is 75 cm with bed system.

The mechanical and work rate performance of that planter was inspected as draught requirements, fuel consumption and field efficiency for different operating speeds and three planting depths in addition to the effect of mechanization on potato tuber moth.

Meanwhile the population dynamics of the potato tuber moth and the influence of potato cultivar, planting date, planting depth, hilling-up, sprinkler and drip irrigation intervals on insect infestation and on the greening of tubers in the field were studied.

Irrigation effectively reduced damage caused by insects and greening of tubers, **Shelton and Wyman (1979b).**

Keeping the soil moist prevents the formation of cracks through which the tuber moth larvae and light can reach the tubers.

These results suggest that significant reductions in P.T.M infestation and greening of tubers could be achieved by planting seed tubers 7 cm deep as early as the first week of Jan.

Hilling-up 14 weeks after planting and irrigation the crop lightly every 4 days.

hand, the cultivated area in bed system, comparing between M1, M2 and M3 show:

M1= 1.2 times of M2

M1= 1.18 times of M3

**The number of plants per m²**

For M1=7.14 M2=6.66 M3= 5.55 in case of planting space of 20cm.

1000 tons of soil must be moved to dig one hectare of potatoes means that 20-50 tons of potatoes have to be separated without damage from ± 1000 tons of soil and from a certain amount of haulm and weed, apart from stones and clods. Therefore, the depth of planting should be very consistent and as shallow as possible; the seed bed preparation and ridge building must be done very carefully and clods must be avoided.

$pb = \dfrac{MS}{US}$ = gram /cm³

pb for sandy soil = 1.6 gram/cm³

pb for clay soil   = 1.1 gram/cm³

1- In case of bed system planting depth of 5cm the height of bed with 15cm- 20cm planting spaces 20cm.

$pb = \dfrac{MS}{US}$        $\therefore MS = 1.8 \times US$

$MS = 1.6 \times \dfrac{110 + 125}{2} \times 18 \times 20 = 75.2\text{kg per 2plant} = 36.6 \text{ kg/plant}$

                                              = 33.84 kg/plant

MS= 1.6 x 117.5 x 18.25                    = 42.3 kg/plant

MS= 1.6 x 117.5 x 18.30                    = 50.76 kg/plant

Table (6-1) The weight of soil removed to dig one plant in case of planting spaces of 20,25 and 30cm in the three planting methods M1,M2 and M3 at three planting depth of 3-5-7cm.

# 6-Contribution to knowledge

The aim of the present study is to decrease the damage of potato tuber moth and greening tubers using different way from using pesticides. The normal planting methods are in rows because of furrow irrigation and drainage. But in the new reclaimed areas which sandy , irrigation systems are drip and sprinkler. That means that water go thought the rows in furrow irrigation, but in drip and sprinkler irrigation, the irrigation water comes from above the ridge. Therefore we did not need the row system for irrigation specially in sandy soil. Drip or sprinkler, can use in the bed planting.

In planting with rows system, the tubers can rise through the ridge to surface the sun and light with potato tuber moth and greening tubers. Both cases damage the yield. The damage of P.T.M destroys the tubers, and the greening of the tuber which is associated with the glycoalkaloids α-solanine and α-chaconine concentrated under the skin, which have toxic properties (Brown and keeler, 1978 using chemicals to kill the potato tuber moth makes a bad effect of environment, public health, and at last potato crop exports less to foreign countries.

The developed planter make the rows look like bed with flat surface. Meanwhile, if the first aim of study was to increase the potato yields quantity and quality. So the second aim is to make the harvesting easy by using small digger and small tractor power.

The movement of soil at harvesting time depends on planting depth, for M1, the height of bed may be 18cm, while for M2 and M3 may be more than 18cm, because the pyramids shape of the row, therefore the soil movement could be more than for M1 and the hight of the soil which has potato crop may be more also. From the present study we can show that using the bed system is very suitable for many purposes. On the other

| The weight of soil movement at different planting methods | | | | | Power at different planting spaces | | |
|---|---|---|---|---|---|---|---|
| Planting Method | Planting Depth | Planting spaces 20cm | Planting spaces 25cm | Planting spaces 30cm | power at planting spaces 20cm | 25cm | 30cm |
| | D1 3cm | 33.84 kg | 42.3 kg | 50.8 kg | 3.7 | 4.6 | 5.4 |
| | D2 5cm | | | | | | |
| M1 | D3 7cm | | | | | | |
| | D1 3cm | 30 | 37.4 | 45 | 3.3 | 4.1 | 4.9 |
| | D2 5cm | 33 | 41.6 | 50 | 3.6 | 4.5 | 5.4 |
| M2 | D3 7cm | 36.6 | 45.8 | 55 | 4 | 5 | 6 |
| | D1 3cm | 35.7 | 44.6 | 53.5 | 3.9 | 4.84 | 5.8 |
| | D2 5cm | 40 | 49.6 | 59.5 | 4.34 | 5.4 | 6.5 |
| M3 | D3 7cm | 43.6 | 54.6 | 65.5 | 4.72 | 6 | 7.1 |

Data show that using M1 in case of planting spaces 20cm we must separate 33.84kg of soil at planting depth of 3cm, to dig one plant. Meanwhile, with the same conditions for M2 must separate 30kg of soil and for M3 35.7kg. That was done in case of using two-row elevator digger Fig (6-1) Both fig (6-1) and (6-2). Show the digger product going up to the ribbon, which lets soil fall and conveys the potato on a central row by means of suitable grill.



Fig (6-1)

Fig (6-2)
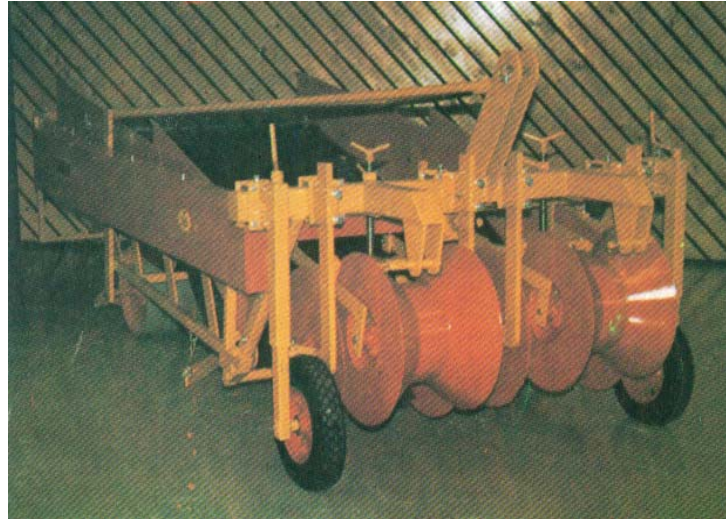


At planting spaces of 30cm and planting depth of 7cm for M2 55kg/row and for M3 65.5kg and here it will be problem for the belt of the digger and in the same time the required power will be high. because of we make comparing with the two types of digger Need ±30h in case of planting depth of 3cm. Meanwhile we would lose a lot of potato under M2and M3 planting methods because the shape of rows is not flat but pyramids shape. Thus we have to use more depth to keep the product clean of potato tuber moth and greening tubers.

Data show that the soil which movement in case of bed system is more than the soil movement in old planter. That is because of the cross section for the bed system is more than the cross section of old planter with 22% meanwhile with M3 ((new planter)) is more than bed system with 5%

but from the study; the damage with potato tuber moth in case of M1 with all treatments is close to zero while in case of M1 the damage in the field at harvesting time is more than 25%, and in the tradinational stores may be close to 100% in the same time with the shape of the ridge of M2 we can not use a shallow planting depth comparing with M1 i.e. in our study about the soil movement we mention that the total height is 18cm while this height with bed may be between 15 or 14cm. That is if it is 14 cm

height, the soil movement for one plant with planting spaces of 20cm equal 26.3kg of soil less than the same condition with M2 (27kg).

To dig one hectare of potatoes means that (20-50 tones of potatoes) have to be separated (without damage) from ±1000 tons of soil and from a certain amount of haulm of weeds, apart from stones and clods.
The optimal ridge for potatoes must have a cross section of 600 cm², a basis of 50cm a height of 20cm and round top consisting of loose soil.