

## CONSIDERATIONS REGARDING THE HARVESTING TECHNOLOGIES OF JERUSALEM ARTICHOKE

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### ABSTRACT

*Jerusalem artichoke (Helianthus tuberosus L.) is not cultivated on the large surface that cereals, vegetables or potatoes so mechanizes technologies are not very often encountered.*

*In this paper are presented few technologies used on the country where this culture occupied large surface and not only.*

### INTRODUCTION

Jerusalem artichoke (*Helianthus tuberosus* L.) is familiar to many as a weed, but has some potential as a crop plant. Native to the central regions of North America, the plant can be grown successfully throughout the U.S. under a variety of temperature and rainfall regimes. Several North American Indian tribes used Jerusalem artichoke as food prior to the arrival of European settlers. The explorer Champlain took Jerusalem artichokes from North America to France in 1605. By the mid 1600s it was widely used as a human food and livestock feed there [1].

Jerusalem artichoke is part of the Asteraceae family (Compositae), being a perennial plant through its tubers, but with annual rods (stems). The rods are strong, vigorous, sometimes branched at the base, with a height of 1.50-2.00 m or more, with oval leaves covered with stiff bristles.

Flowers are grouped in yellow heads, much smaller than sunflowers. It is a very vigorous species with a great tendency to invade the environment, becoming a rather difficult to control weed.

This is a very rustic plant with no special soil requirements and very well adapted to temperate climate conditions.

It exploits well all types of soil, even on them very poor, except those with excess moisture. It resists very well the frosts in the winter and prolongs it, and also supports excessive drought.

A species that is particularly favorable to organic farming in our area and can produce very good produce without any special intervention.

The main causes limiting the growth of this species in culture are the very long vegetation period and the uneven grounding of uneven tubers.

The species itself is very less demanding for the soil fertility status, but it must be considered that, through the large production (tubers and stems), it is a plant that depletes the soil. Therefore, after this crop, in the crop should be done good organo-mineral fertilization and cultivate less demanding species in soil fertility.

The main feature of the species, which must be considered in adopting the culture system, is the lush plant growth,

which requires a sufficient space for growth and development.

It is planted directly in the spring field (from February to April) when the time allows, even in snowy must, at a distance of 70 cm, the distance between plants per row of 50-60 cm, the planting density at the plantation being 9,000- 11,000 plants / ha.

When planting isolated (on small surfaces), it is intended to create a space of one sq m / plant, in order to ensure the necessary volume for development, especially when the crop remains for more than a year on the same site.

Tubers (1-2 pieces) are planted in nests at a depth of 8-10 cm.

Exigencies of the species are minimal in maintenance work. Irrigates only in extreme cases (excessive drought). In areas with strong winds, the young stalks (25-30 cm) can be skewed to avoid rupture.

In the autumn, stems can be shortened to 1.50 m in height when their height is disturbing.

Soil maintenance and weed control is done only by handwashing that is repeated as often as necessary (generally 2-3 times) and no further intervention is required.

Tubers are formed only in autumn. The crop cycle is between 180-210 days and the production potential of the species is between 40 and 60 t / ha (4-6 kg / mp) depending on the plant type and crop system.

At harvesting, careful assembly of all tubers should be considered to avoid their uncontrolled spread in space.

Jerusalem artichoke also provides an important production of stems, which autumn become woody, rigid, used as firewood or as poles for supporting other vegetables [2].



**Figure 1 - *Helianthus tuberosus***

Harvesting Jerusalem Artichokes start after the first frost, when the plants begin to die back (around late autumn—November in the northern hemisphere). If you're somewhere warmer then leave harvest until mid-winter.

Jerusalem Artichokes aren't easy to store well but one of their advantages is

that they're quite happy left in the ground until you need them. If your ground tends to freeze, mulch well to ensure that you can extend the harvest period. If you do need to store them, ensure you put them somewhere very cool and with high humidity to help prevent them from shrivelling [3].



**Figure 2 – Tuberos of Jerusalem artichoke [3]**

Replanting for the following harvest it's not necessary to dig them all up if you've created a permanent bed for them, but they'll become congested in a couple of years if you don't. So, in early spring,

dig over the bed, removing all you can find and replant (in the same place if you wish) the smoothest, biggest ones you come across. This helps ensure less knobby artichokes in future years [3].

## **MATERIAL AND METHOD**

Jerusalem artichoke is harvested in the vast majority of cases manually because the areas it cultivates are not yet very large. In some countries, the cultivation of Jerusalem artichoke has begun to be done on large surfaces due

to the many uses in the diet of humans, animals, energy production, so that on these farms can be harvested mechanically using trailed or self-propelled combines.

## **RESULTS AND DISCUSSIONS**

Harvesting the tuber crop is similar to potatoes, with a few exceptions: the potato vine is weak and usually has senesced before harvest, which is in contrast to the continued growth of the strong artichoke stems. Potato tubers separate easily from the stems, while the large mass of artichoke tubers are strongly attached and intertwined with the roots. By adding small chains and increasing agitation, you can convert a

potato digger to a Jerusalem artichoke digger. Artichoke tubers are smaller than potatoes, so these modifications are necessary to decrease the potential 50% loss that may occur with a conventional potato digger. Tops, roots, and tubers can be sorted as they are harvested, or they can be dried and then sorted. Artichoke tubers will wilt and soften much faster than potato tubers and thus cannot be left at low humidities too long before storage [2].

When grown on stretched surfaces, the harvesting of the tubing is done

mechanically using self-propelled combines (Fig. 3) or trailed combines (Fig. 4).



**Figure 3 – Harvesting of the Jerusalem artichoke with self-propelled combine [4]**



a) [5]



b) [6]

**Figure 4 – Harvesting of Jerusalem artichoke using trailed equipment**

The harvesting of the topinambur is also carried out in two phases: the first - the strains (Fig. 5) are harvested, for the

production of biogas or briquettes pellets and the second stage: harvesting the tubers.



a) [7]



b) [8]

**Figure 5 – Harvesting of the Jerusalem artichoke strains**

In most cases, the areas grown with Jerusalem artichoke are medium or small so that trailed potato harvesting equipment

can be used which performs the efficiently harvesting of the topinambur tubers (Fig. 6).



a) [9]



b) [10]



**Figure 6 – Harvesting of the Jerusalem artichoke tubers on the small and medium surfaces**

In households and very small farms harvesting is done manually (Fig.7) with

hoe or other specific equipment that can be used by one person.



**Figure 7 – Manually harvesting of the Jerusalem artichoke tubers**

## CONCLUSIONS

Jerusalem artichoke is a technical plant whose expansion has grown in recent years due to its rich in inulin content and reduced carbohydrates and proteins, which gives it a wide use in the diet of people with health problems: diabetes, digestive, overweight, etc.

This can be an alternative to potato, however, due to the irregular shape of the tubers, namely the fact that it is a perennial plant that can not easily be replaced (crop rotation), when it begins to disappear after approx. 10-12 years, the land must be intensively fertilized

because the topinambur totally degrades the places where it is grown.

At present, mechanized harvesting is not widespread because the topinambur

is not grown on large surfaces, the most commonly used processes being manual and small to medium-trailed equipments.

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