TECHNOLOGICAL DATA SYSTEMS IN VEGETABLE PRODUCTION

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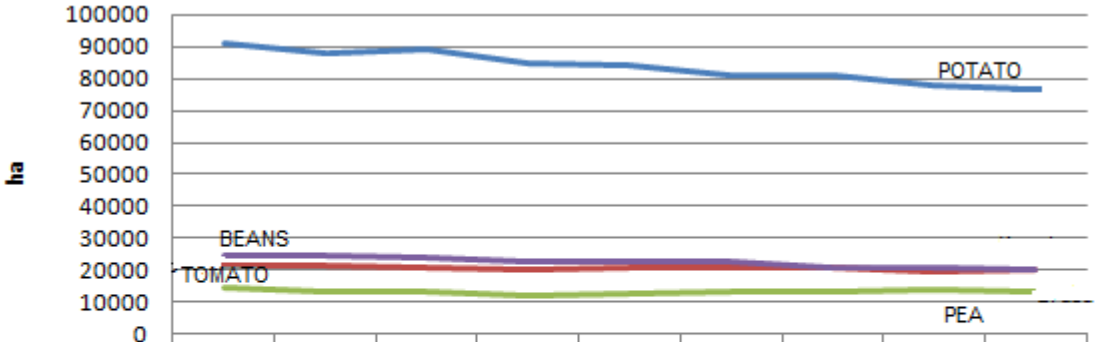
Summary: *Vegetable growing in the agricultural production represents a significant share of the population and food exports. Evidently, a small area, a large proportion of the workforce regardless of the high yields make it impossible to enforce this area of agriculture, as one of the most important in the field of competition. The paper discussed the possibility of applying mechanized process of growing fruit, vegetables one of the possibilities that the level and quality of production is known primarily from the point of economic feasibility of production and brand in the domestic and foreign markets (raw or processed fruits).*

Keywords: *Truck farming, soil cultivation, sowing, machinery, economy*

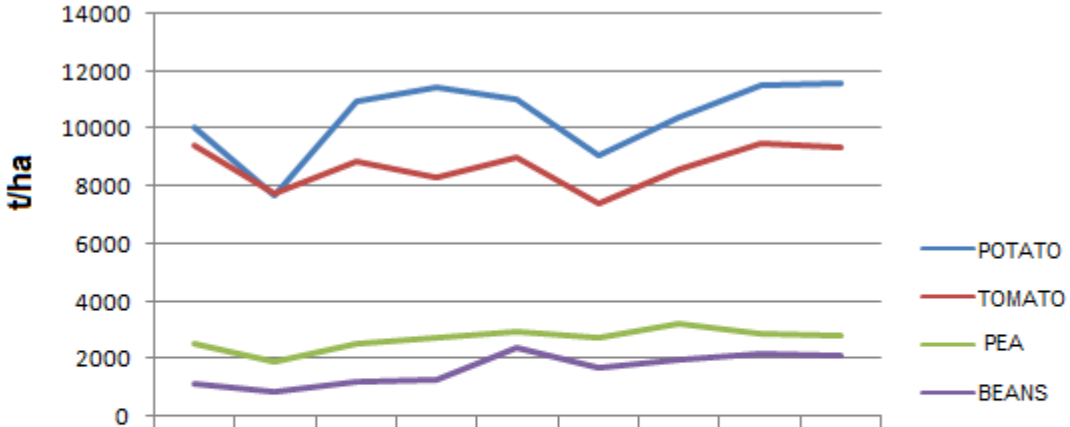
INTRODUCTION

Vegetable fruits are used for human consumption and consumed in fresh or processed condition. A large amount of vegetables used as raw materials in industrial processing plants. When it comes to the area under vegetables, they make up almost 6% of total arable land and 290 000 ha. Vegetable production includes one of the most intensive sectors of agricultural production due to the high share of investment and irrigation. During the year, primarily in the fields, greenhouses and growing alternate two or three kinds of vegetables. According to the yield per unit area, the realized income and the participation of human labor farming can provide five to eight times the value of production in the open and in greenhouses and 190 to 250 times compared to wheat. This type of production has an important perspective to the favorable natural conditions for production of vegetable crops and the large demand in the domestic and international markets. It should be noted that the areas under vegetable crops in Serbia from 2002 to 2010 has not significantly changed, and even has a downward trend for potatoes and 16%, 9.5% tomato, peas and beans 6.5% 8.2% while increase the yield per unit area, due to the application of appropriate agro-technical measures, which were higher for potatoes by 15%, 55% for beans, peas in 9.7% while the tomatoes remained the same. Graphical representation of total seed (surface) of certain types of vegetables is shown in Figure 1, a display of yield per hectare in Figure 2.



	2002	2003	2004	2005	2006	2007	2008	2009	2010
POTATO	91199	88131	89050	85034	84434	81000	81000	78169	76675
TOMATO	21177	21209	20855	20428	20947	20583	20583	19921	20181
PEA	14306	13033	13109	11926	12389	13149	13149	13481	13258
BEANS	24716	24794	24145	23162	22678	23000	21000	21202	20268

Figure 1. Graphic representation of the total area under plantations of certain types of vegetables



	2002	2003	2004	2005	2006	2007	2008	2009	2010
POTATO	10061	7707	10949	11402	11018	9110	10390	11492	11573
TOMATO	9405	7713	8855	8276	9033	7385	8575	9505	9386
PEA	2525	1911	2524	2750	2946	2691	3198	2885	2771
BEANS	1124	828	1157	1293	2418	1695	2000	2185	2133

Figure 2. Graphical representation of certain types of vegetable yield per hectare

RESULTS

Vegetable production is carried out:
a. outdoors:
- Garden production,
- Field production.
b. in protected areas.

The basis of the larger parcels makes specialized industrial mechanized intensive vegetable production under irrigation conditions. Mechanized production requires the addition of specific varieties and well-prepared land and precise planting (as opposed to garden production), on a flat surface or beams while maintaining optimal crop canopy.

The specificity of the vegetable production is growing at:
- A flat surface,
- Bank
- Lejam (gardens)
- High Leji,
- Fitarijum, checkers and
- Beams.

The distance between the bank (reef) depends on the kinds of vegetables produced and ranges from 50 to 90 cm while its height (measured from the bottom of the groove) is from 10 - 25 cm.

Lei gardens land is rectangular in shape, width from 100 to 150 cm maximum length to 40 feet. Lei is placed parallel to the length of 30-60 cm wide lanes. In addition to frontal lei leaves 2-3 m in width.

High lei can be in the form of mounds or in a square box made of boards.

Fiterije low lei on land about 120 cm wide and 5-10 m long ridge of land bordered by 15-20cm high. They are not particularly suitable for vegetables.

The furrows are cultivated varieties of winter and autumn, and the gravitational irrigation. Grooves in the direction of the fall of the land width 40-50 cm wide with ridges 30 to 50cm.

For industrial production is characterized by a specific system of cultivation in the beams of different widths. Beams are formed in the fall or spring. The advantage of vegetable production in the beams is that it allows more even growth of plants and evenly ripening fruit. Depending on the applied production process and technical solutions can be walked in one form one or more beams, depending on the dimensions of beams and machine width. Geometric parameters of beams in the application of modern systems are given in Figure 3 with the necessary data in Table 1.

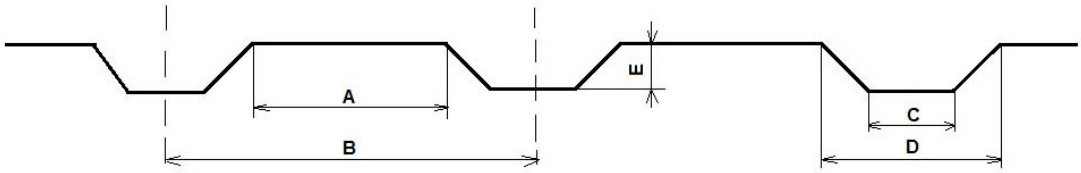


Figure 3. The basic geometric parameters of beams.

Table 1. Geometric parameters for the different way of forming beams.

	System	A	B	C	D	E
		mm				
1	FMC	~ 1150	~ 1500		380	~ 125
2	VBG	~ 1200	1600	120	400	150
3	SIMON	1250 – 1850	1520 – 2200			
4	BS	1200	1650			
5	BAG-G	200	500			

In the technological process of production processing of vegetable land is extremely significant. The most common classic treatment is applied or basic soil treatment and processing of additional land, although the subsequent processing and use of land which is applied after seeding and planting for maintaining favorable conditions for developing crops. Primary treatment of land that is both profound and subsequent processing of additional land being carried out at lower depth is achieved by such a structure that the surface layer of finely powdered soil with increasing depth while increasing coarseness and clumps, Figure 4. This allows the square root of plants better, easier access to the root system of nutrients, better air circulation, moisture and heat in both directions, and economically more justified tillage.

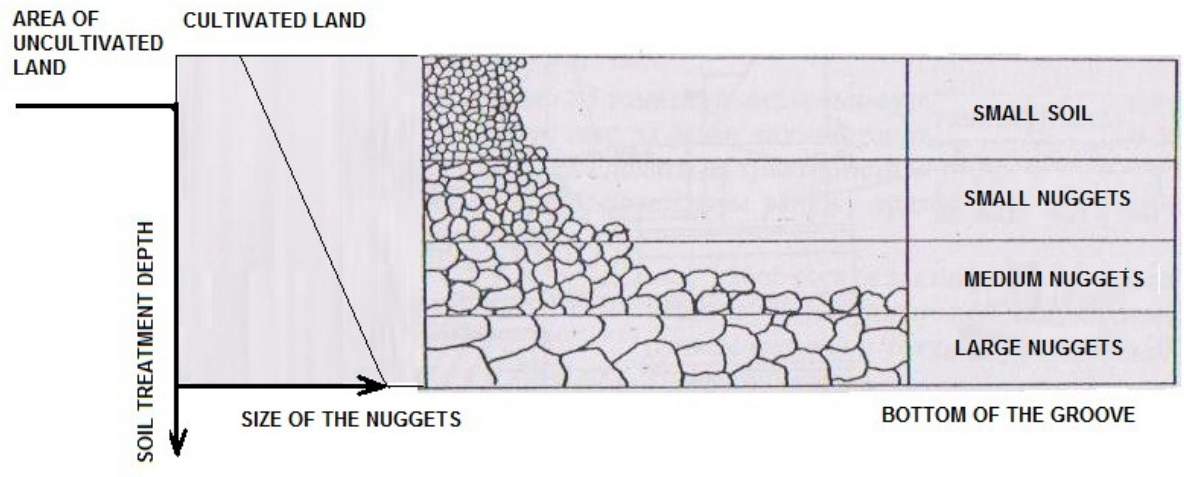


Figure 4. Schedule fraction of land in depth

Primary treatment is usually performed rotary plows that leave a flat surface without a ridge and ditches is the case with turn-plow. After many years of plowing the same depth it is advisable to apply razrivača (working depth up to 50 cm) that allow the distraction subplouging layer which allows, among other things that the land becomes more permeable to excess moisture and capable of akomulaciju more water to make yields more stable and . For additional soil treatment most commonly used machines with active working bodies and to the rotation or translation motion, Figure 5.

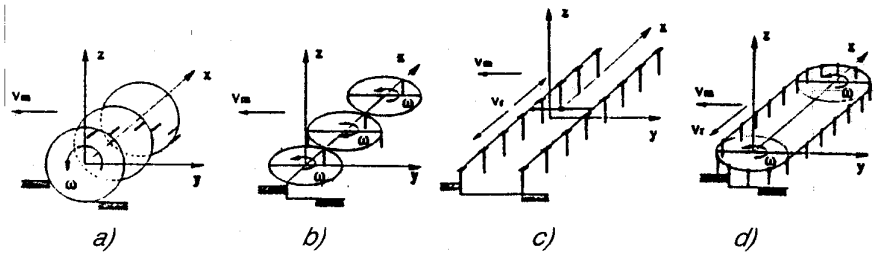


Figure 5. Move active labor elements
a, b - a rotating motion, c - Oscillating prabvolinijsko,
d - pan evenly

The display solutions not only used for remedial treatment of land but also ukviru beams forming machines that perform several operations in one walk. This system is particularly pronounced in the American system for forming beams. TILTHER"machine", Figure 6, the FMC system next to the entry of pesticides, fertilizer input, grinding and mixing of topsoil with rotating chipper, leveling the upper surface of beams and shaping ditches using a specially designed plate and performed sowing.

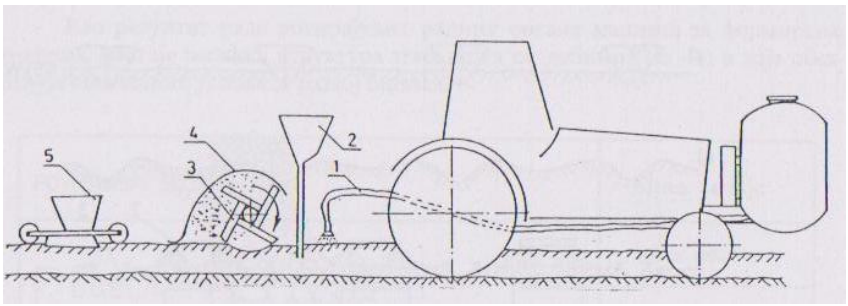


Figure 6. Machine for the final formation of beams TILTHER""(FMC)
1. Pesticide input device, 2 Input device of mineral fertilizers, 3 rotating chipper,
4. Shaped panels for leveling the upper surface of beams and the formation of ditches,
5. Seeder

Characteristic for the Bulgarian system for establishing the beams to land first prepared for irrigation by using appropriate machines, figure 7, the plot area so that water can form that leads directly into ditches (grooves) or a specially formed recesses in the surface of the beams.

Machine LUG-3.2, Figure 7 Mounted type and is at work relies natočkove (1) that are used to control the depth of ditches. Jianhu County Fujie symmetrical body (2), behind the wheels of tractors (4) forming a trench. In the central part of the machine are set leveling boards (3) through which the beams forming the top surface of the reef. Depending on the mode and intensity of irrigation water is supplied to the positions A, B and C.

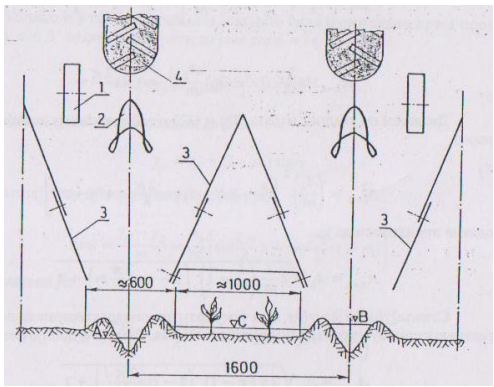


Figure 7. Schematic diagram of the system to form beams
with the possibility of dual irrigation

In modern terms used vegetable production land cover with foil (persistent, fotodegradable or biodegradable) which impact on reducing consumption of labor, reducing the number of passages and walked lots, reducing evaporation of moisture, preventing the creation of crust, preventing the creation of the appearance of weeds and plant diseases, accelerating the emergence and reduction of vegetation which affects the maturation of the fruit quickly.

Material for mulching be chopped straw, corn, hay, komspost, peat, shredded parts of plants, foil (colored white, black) and paper mulch. Organic materials and paper mulch and fertilizer at the same time form the basis of biological produce.

Developing solutions in vegetable production is moving towards the development of complex machines that perform in a walk and taking the film and sowing. One of the solutions shown in Figure 8 plow through the body (1), which are located on both sides of the machine form the ditches into which are placed side edges of the foil. Folio in a roll (2) by means of smooth rollers (3) lays on the surface of the land while using the wheel (4) located on both sides of the machine, the side edges of the foil imprinted in the previously established ditches. With part (5) backfilled the land to the side edges of the foil in order to remain fixed on the land. Seeder (6) is the most common pneumatic sowing with panels that can change depending on the number and size of the hole. Under the mechanism is sowing seed investors in the form of beaks (7) which are arranged in size carrier (8). Depending on the number of beaks of the medium, with valid synchronization with the speed of rotation planting panel, set the seed spacing within the row to sow. In reversing the carriers with their beaks film comes to drilling and penetration depth of the beak at a certain level where the lowest point of the beak opens and the seeds deposited on the bottom of the hole. Rear section of each planting is pressing the wheel (9), which has the task of straightening by pressing challenges of loose soil and thus soil covering seeds.

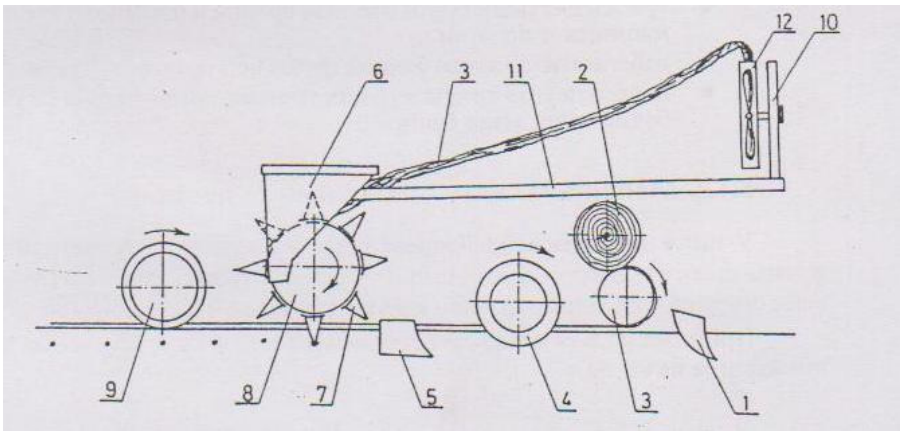


Figure 8. A complex machine for taking the foil and sowing.

Seedling production represents one of the most sensitive stage in the production of some types of vegetables because of its great performing with the use of seedlings. Growing vegetables with the use of planting seedlings has several advantages compared to direct sowing, which are reflected in the earlier harvests since the seedlings produced in greenhouses, greater crop uniformity, uniformity of maturity, higher yields and more economical use of plant seeds.

In produce seedlings require high expertise in all phases of the production process. Because of the many shortcomings of classic nursery production systems are more and more in the way of application containers where the seedlings develop in the growing media which pervades the root system and with the planting substrate. In the production of seedlings of vegetables CONTAINER happiness mainly two types of containers:
- Made of polystyrene - foam
- Made of hard plastic.

The most common container sizes are: length 500-600 mm, width from 300 to 400 mm and 80 mm high. Number of cells in the container varies from a few dozen to several hundred. Cells can take different forms in which the most commonly used in the form of inverted truncated cone and truncated pyramid. These forms make it easy to exclusion, extraction, seedlings with growing media.

Semi-automatic machines for planting nursery container type while taking film company MAS Italy is shown in Figure 9 Only one worker performs servicing of the machine that planting is done in four rows. Less common in nursery worker because guides provided. The capacity of these machines is 7000 to 10,000 plants per hour planting with one or two workers on the rear platform. The disadvantage is the small capacity of storage boxes with seedlings.

Figure 9. Semi-automatic machines trailed MAS - Italy

CONCLUSION

The specificity of vegetable production imposes numerous requirements that are primarily related to soil tillage, fertilization, seeding or planting and irigation. The introduction of new technologies and their application significantly increases the degree of mechanization procea so we get the quality and quantity of products, and fruits. The development of machines for forming beams, propagation and application of foil container system when planting was made possible greater economic justification of products and higher revenues relative to investment. A significant influence on the development of new technologies in vegetable production is more intensive development of machines to perform several operations in a walkthrough that allow you to connect a number of operations of tillage, fertilization, the formation of billets, foiling, plant, and a security system for irigation.

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