

**THE STUDY ON THE INFLUENCE OF MOTHER - PLANT BULBS' ORIGIN FROM LINKS OF DIFFERENT SELECTION AS WELL AS THE SIZE OF THE MOTHER – PLANT BULBS ON THE VEGETATIVE AND GENERATIVE DEVELOPMENT OF BUDS INTO SEED-TREE' FIELD UPON “DIANA” TRIENAL ONION VARIETY**

**STUDIUL PRIVIND INFLUENȚA PROVENINȚEI BULBILOR-PLANTĂ MAMĂ DIN VERIGI DE SELECȚIE DIFERITE, PRECUM ȘI A MĂRIMII BULBILOR – PLANTE MAMĂ, ASUPRA DEZVOLTĂRII VEGETATIVE ȘI GENERATIVE A MUGURILOR ÎN CÎMPUL DE SEMINCERĂ LA LINIA DE CEAPĂ TRIENALĂ “DIANA”**

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***Abstract.** The work includes partial results of some research carried out over a period of time which includes several biological cycles „from seed to seed” on the determinism of some quantitative features of mother-plant bulbs, to „Diana” onion of chives variety, on the vegetative and generative development of plants from seed-tree phase. The quantitative characteristics are mainly associated with the size of the bulb (the longitudinal diameter, transversal diameter, bulb weight, number of developed buds inside bulb, etc.).*

**Key words:** mother-plant bulbs, quantitative features, vegetative and generative development

***Rezumat.** Lucrarea cuprinde rezultate parțiale ale unor cercetări efectuate pe o perioadă care cuprinde mai multe cicluri biologice „de la sămânță la sămânță” privind determinismul unor caracteristici cantitative ale bulbilor-plante mamă, la soiul de ceapă de arpagic „Diana”, asupra dezvoltării vegetative și generative a plantelor din faza seminceră. Caracteristicile cantitative sunt legate, în principal de mărimea bulbului (diametrul longitudinal, diametrul transversal, greutatea bulbului, numărul de muguri dezvoltați în bulb etc.).*

**Cuvinte cheie:** bulbi-plante mamă, caracteristici cantitative, dezvoltare vegetativă și generativă

## **INTRODUCTION**

The maintenance and multiplication of a cultivar requires the accumulation of obtained results following thorough studies on genetic determinism of cultivar, phenotypically expressed by the intensive features of the

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cultivar. This is done by conservative selection, carrying out phenological and phenotypical observation and biometric determinations in all links selection.

In the case of seeds intended for sowing, the first quality criteria are related to the physiological itself as germination, germination energy and moisture of the seeds or biological and cultural characteristics such as purity, authenticity and specific weight of the seeds, health.

The notion of seed quality also includes a series of properties that determine the potential existing vigor of the seeds and externalized by the qualitative and quantitative yield after sowing the seed. The seeds that give good results in this aspect have great vigor, do not grow quickly, the plants easily cross the crust out of the soil, pass quickly to autotrophy and are resistant to pathogens (Enăchescu, 1974).

The number of bulbs planted per hectare is very variable depending on the cultural density and the size of the bulbs planted. Experiments in this direction have shown that large bulbs that have reserved food and sprout stronger give 25% more flower stalks, and production increases up to 40% (Nastase *et al.*, 1965).

The seed used to establish the field of choice (mother plants) must necessarily belong to a certified biological category. The effective choice of the elites is made at the maturity of the bulbs, based on their typicality, vigor and health characteristics (Cordea, 2008).

The planting material must be stored in appropriate temperature conditions, depending on the purpose of its use. Thus, “mother plant” bulbs to be planted in the field, in order to produce seeds, must be kept in the presence of a temperature that favors as much as possible the differentiation of flowering buds, at 4-8 ° C (Dumitrescu *et al.*, 1977). In the absence of such conditions, keeping the mother plants over the winter is done by silage (Cordea, 2008).

The work refers to the results of the study concerning the influence of some bulb features used as mother-plants in the production of triennial onion seed, as well as the influence of selection link of biological material used as bulbs- mother-plants in numeric determinism of buds, vegetative and generative extended for seed-tree phase.

## MATERIAL AND METHODS

Researches have been carried out in the period of 2016-2020 year, in the experimental field from SCDL Iernut. The studies have been carried out on the biological material of variety of “Diana” triennial onion (fig. 45).

In 2016 year, the experience has included two experimental plots of seed-tree plants in which were used as a biological material the mother-plant bulbs of different size:

-experimental A plot = 50-80 g/bulb,

-experimental B plot = 20-30g/bulb.

The number of mother-plant bulbs has represented the total number of bulbs included in those two intervals (50-80 g/bulb and 20-30 g/ bulb) of the whole population of mother-plant selection field carried out in 2015 year.

So:

- in the experimental A field has studied, in its progenies, the vegetative and generative development of 1443 bulbs (tab. 1);

- in the experimental field B has studied, in its progenies, the vegetative and generative development of 681 bulbs (tab. 2);

In 1997 year have studied three experimental fields (C, D, E) different by origin:

- in the experimental C field has studied, in its progenies, the vegetative and generative development of 755 bulbs derived from CApl.m – mother-plant bulbs selection field (tab. 3);

- in the experimental D field has studied, in its progenies, the vegetative and generative development of 1772 bulbs derived from CSIIpl.m – II selection field of mother-plant bulbs (tab. 4);

- in the experimental E field has studied, in its progenies, the vegetative and generative development of 1167 seed-tree plants derived from Pbs (tab. 5).

## RESULTS AND DISCUSSION

In the A experimental field (50-80 g/bulb), where were planted 1443 bulbs, at 1410 bulbs the buds have recorded a generative development and to 33 bulbs, the buds have had a vegetative development forming bulbs and not floral rods with seed.

Depending on the number of floral rod developed on the plant were established six groups of plants, from which five groups have contained plants with floral rods and a group has included plants which have recorded a vegetative development forming new bulbs. (V1 ... V6) in this field where (tab. 1, fig. 1- 6):

- in V1 variant (fig.1) have included 237 plants which represented 16,5 % from the total number of plants, of which: 232 plants have issued 1 floral rod/plant and 5 plants which have developed only vegetative buds from which have formed bulbs;

Table 1

**Vegetative and generative development of seed-tree' buds - experimental A field**

Variant	No. of seed-tree plants		Rod number/plant (generative development)						-T (vegetative development)
	total	%	1	2	3	4	5	6	
			<b>Number of plants</b>						
V <sub>1</sub>	237	16.5	232	-	-	-	-	-	5
V <sub>2</sub>	701	48.9	117	571	-	-	-	-	13
V <sub>3</sub>	410	27.9	17	75	304	-	-	-	14
V <sub>4</sub>	83	5.7	4	6	28	44	-	-	1
V <sub>5</sub>	10	0.7	-	1	2	1	6	-	0
V <sub>6</sub>	2	0.1	-	-	-	-	-	2	0

- in the V2 variant (fig. 2) have included 701 plants which represented 48.9 % from the total number of plants, from which: 117 plants have issued a floral rod/plant, 571 plants have issued by 2 floral rod/plant and 13 plants which have developed only vegetative buds from which are formed bulbs;

-in the V3 variant (fig. 3) have included 410 plants which represented the 27.9 % of the total number of plants, of which: 17 plants have issued a floral rod/plant, 75 plants have issued by 2 floral rod/plant, 304 have issued 3 floral rod/plant and 14 plants which have developed only the vegetative buds from which they are formed bulbs;

-in the V4 variant (fig. 4) have included 83 plants which represented 57 % of total plants number, of which: 4 plants have issued a flower rod/plant, 6 plants have issued 2 floral rod/plant, 28 have issued 3 floral rod/plant, 44 plants have issued 4 floral rod/plant and 1 which developed only vegetative buds from which are formed bulbs;

-in the V5 variant (fig. 5) have included 10 plants which represented 0.7 % of the total number of plants, of which: 1 plant have issued 2 floral rod/plant, 2 plants have issued by 3 floral rod/plant, 1 plant have issued 4 floral rod/plant and 6 plants which have issued by 3 floral rod/plant;

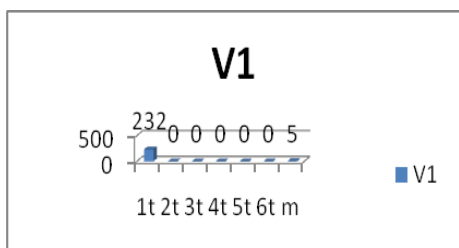


Fig.1 – AV<sub>1</sub>

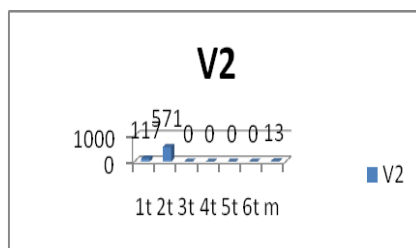


Fig.2 – AV<sub>2</sub>

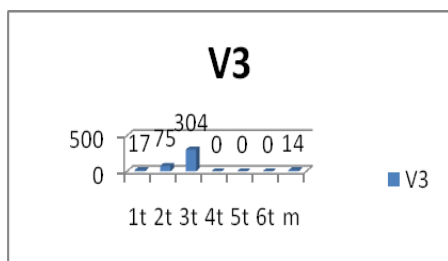


Fig.3 – AV<sub>3</sub>

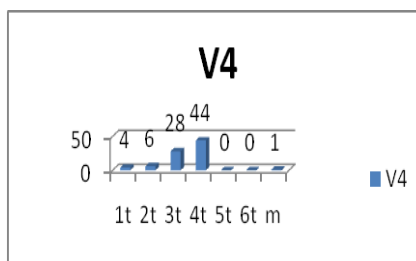


Fig.4 – AV<sub>4</sub>

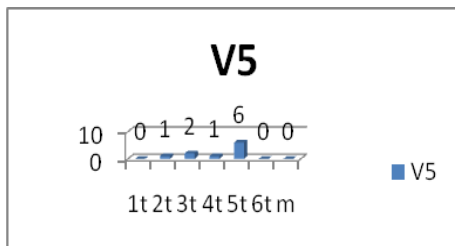


Fig.5 AV<sub>5</sub>

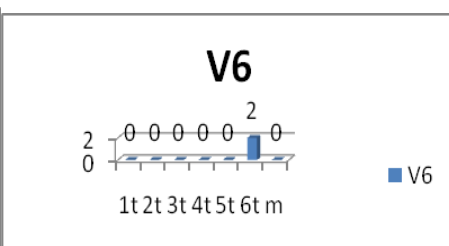


Fig.6 AV<sub>6</sub>

-in the V<sub>6</sub> variant (fig. 6) have included 2 plants which represented 0.1 % and which have issued by 6 floral rod/plant.

In the experimental B field (20-30 g/ bulb), where there were planted 681 bulbs (tab. 2, fig. 7, fig. 8, fig. 9, fig. 10, fig. 11):

- to 542 bulbs, the buds have recorded a generative development and at 139 bulbs, the buds have had a vegetative development forming bulbs and not floral rods with seed;

Depending the number of floral rod developed on plant were established five groups of plants ( $V_1 \dots V_5$ ) which have issued floral rods and a group of plants which have developed new bulbs, where (tab. 2):

Table 2

**Vegetative and generative development of the buds of seed-tree plants –  
Experimental B field**

Variant	No. of seed-tree plants		Rod number/plant (generative development)						-T (vegetative development)
	total	%	1	2	3	4	5	6	
			<b>Number of plants</b>						
$V_1$	268	39.4	213	-	-	-	-	-	55
$V_2$	287	33.0	67	158	-	-	-	-	62
$V_3$	99	14.4	16	16	49	-	-	-	18
$V_4$	23	3.4	3	2	8	7	-	-	3
$V_5$	4	0.6	-	-	2	-	1	-	1

- in the  $V_1$  variant have included 268 plants which represented 39.4 % of the total number of plants, from which (fig. 7): 213 plants have issued a floral rod/plant material and 55 plants which have developed only vegetative buds from which are formed bulbs;

-in the  $V_2$  variant have included 287 plants which represented 33.0 % of the total number of plants, from which (fig. 8): 67 plants have issued a floral rod/plant, 158 plants have issued by 2 floral rod/plant material and 62 plants which have developed only the vegetative buds from which are formed bulbs;

-in the  $V_3$  variant have included 99 plants which represented 14.4 % of the total number of plants, from which (fig. 9): 16 plants have issued a floral rod/plant, 16 plants have issued by 2 floral rod/plant, 49 have issued 3 floral rods/plant and 18 plants which have developed only the vegetative buds from which are formed bulbs;

-in the  $V_4$  variant have included 23 plants which represented 3,4 % of the total number of plants, from which (fig. 10): 3 plants have issued a floral rod/plant, 2 plants have issued by 2 floral rods/plant, 8 have issued the 3 floral rods/plant, 7 plants have issued 4 floral rods/plant and 3 plants which have developed only the vegetative buds from which are formed bulbs;

- in the  $V_5$  variant have included 4 plants which represented 0.6 % of the total number of it, from which (fig. 11): 2 plants have issued by 3 floral rods/plant, 1 plant has issued 5 floral rods/plant and 1 plant which has developed only vegetative buds from which are formed bulbs;

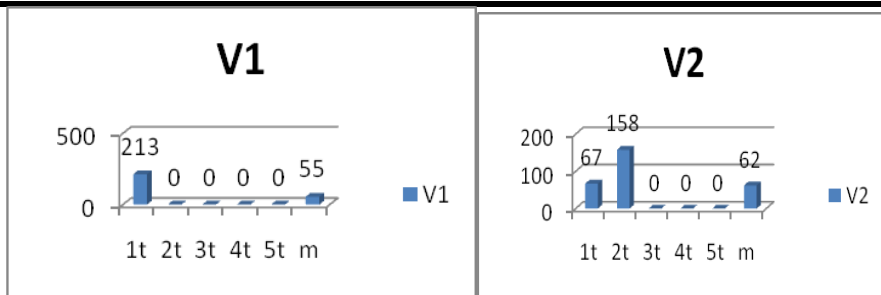


Fig.7 BV<sub>1</sub>

Fig.8 BV<sub>2</sub>

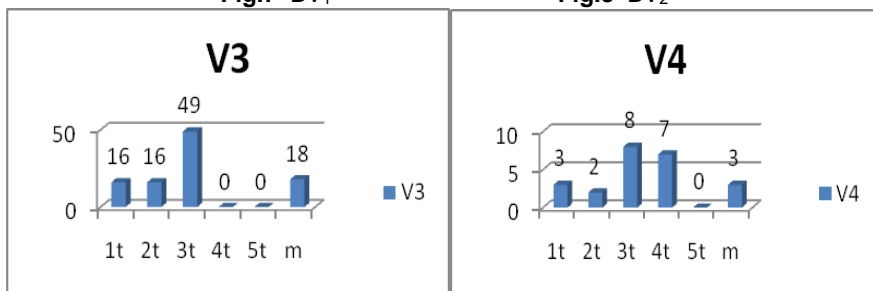


Fig.9 BV<sub>9</sub>

Fig.10 BV<sub>10</sub>

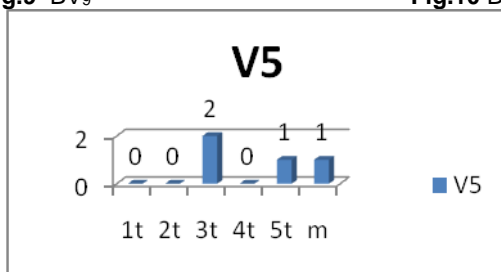


Fig.11 BV<sub>5</sub>

Table 3

Vegetative and generative development of the buds of seed-tree plants-experimental C field

Variant	No. of seed-tree plants		Rods number/plant (generative development)						-T (vegetative development)
	total	%	1	2	3	4	5	6	
			Number of plants						
V <sub>1</sub>	9	1.19	6	-	-	-	-	-	3
V <sub>2</sub>	188	24.87	23	157	-	-	-	-	8
V <sub>3</sub>	339	44.84	7	47	270	-	-	-	15
V <sub>4</sub>	127	16.80	17	39	69	-	-	-	2
V <sub>5</sub>	58	7.67	-	2	17	12	27	-	0
V <sub>6</sub>	29	3.84	-	1	6	4	2	16	0
V <sub>7</sub>	3	0.40	-	-	-	2	1	-	0
V <sub>8</sub>	2	0.26	-	-	-	2	-	-	0

-V<sub>1</sub> – included 9 plants which represented the 1.19 % of the total number of plants, from which (fig. 12): 6 have generatively developed by one bud of which has occurred by a seed-tree rod, and 3 mother-plant bulbs have developed only vegetative buds from which are formed new bulbs;

-V<sub>2</sub> -included 188 plants which represented 24.87 % of the total number of plants, from which (fig. 13): 23 progenies has generatively developed a bud which generated a seed-tree rod, at 157 progenies were registered by 2 buds with generative development from which are formed seed-tree rods and to 8 progenies have vegetative developed the buds which have formed the new bulbs;

-V<sub>3</sub> - included 339 plants which represented 44.84 % of the total number of plants, from which (fig. 14): to 7 progenies has generatively developed one bud, to 47 descending have generatively developed by 2 buds, to 270 progenies have generatively developed by 3 buds and to 15 progenies have vegetative developed the buds of which occurred new bulbs;

-V<sub>4</sub> - included 127 plants which represented 1.80 % of the total number of plants, from which (fig. 15): at 17 progenies have generatively developed one bud, to 39 progenies have generatively developed a by 2 buds, to 69 progenies have generatively developed by 3 buds and to 2 progenies have vegetative developed buds that giving rise to the new bulbs;

-V<sub>5</sub> - included 58 plants which represented 7.07 % of the total number of plants, from which (fig. 16): at 2 progenies have generatively developed by 2 buds, to 17 progenies have generatively developed by 3 buds, to 12 progenies have generatively developed by 4 buds, to 27 progenies have generatively developed by 5 buds;

-V<sub>6</sub> - included 29 plants which represented 3,84 % of the total number of plants, from which (fig. 17): at 1 progeny have generatively developed 2 buds, to 6 progenies have generatively developed by 3 buds, to 4 progenies have generatively developed by 4 buds, to 2 progenies have generatively developed by 5 buds an to 16 progenies have generatively developed by 6 buds;

-V<sub>7</sub> - included 3 plants which represented 0.4 % of the total number of plants, from which (fig. 18): at 2 progenies have generatively developed by 4 buds and to 1 progeny have generatively developed 5 buds;

-V<sub>8</sub> - included 2 plants which represented 0,26 % of the total number of plants, from which (fig. 19): from those 2 mother-plant bulbs, to those 2 progenies have generatively developed 4 buds.

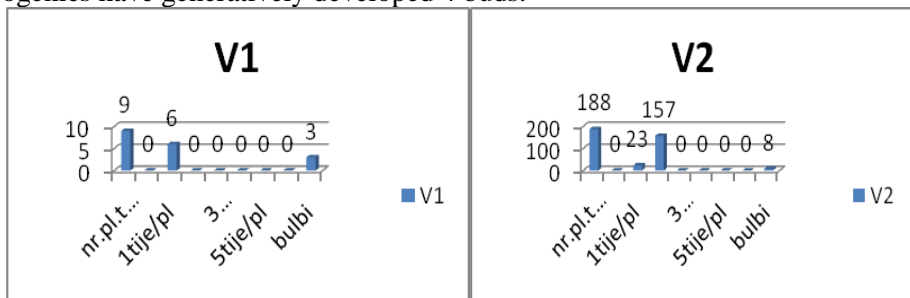


Fig.12 CV<sub>1</sub>

Fig.13 CV<sub>2</sub>

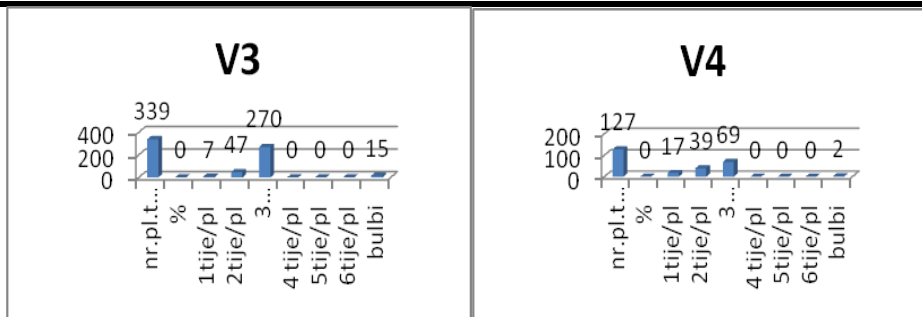


Fig. 14 CV3

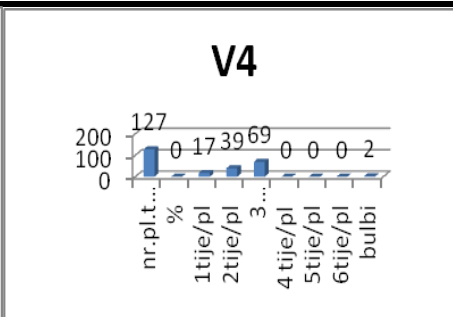


Fig. 15 CV4

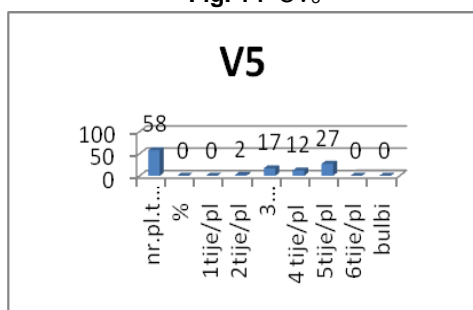


Fig.16 CV5

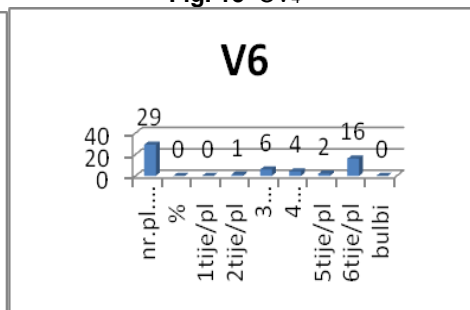


Fig. 17 CV6

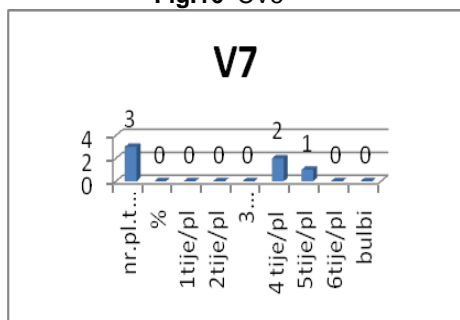


Fig.18 CV7

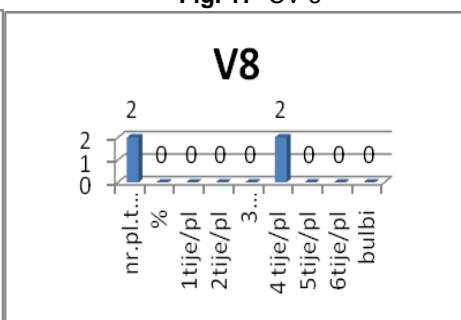


Fig. 19 CV8

In the experimental D field (CSIIplm.), with 1772 mother-plant bulbs had was set up through planting, a field of study of the biological material in its progenies on the vegetative and generative development of buds, where results (tab. 4, fig. 20, fig. 21, fig. 22, fig. 23, fig. 24, fig. 25, fig. 26, fig. 27, fig. 28):

-V<sub>1</sub> - from 58 mother-plant bulbs which represented 3.27%, 46 progenies have generatively developed one bud from which has occurred one seed-tree rod, and 12 progenies have vegetative developed buds from which are formed new bulbs (fig. 20);

-V<sub>2</sub> - from 664 mother-plant bulbs which represented 37.41 %: 91 progenies have generatively developed one bud, 552 progenies have vegetative developed 2 buds and 21 progenies have vegetative developed buds from which are formed new bulbs (fig. 21);



**Vegetative and generative development of the buds of seed-tree plants–  
experimental D field**

Variant	No. of seed-tree plants		Rod number/plant (generative development)						-T (vegetative development)
	total	%	1	2	3	4	5	6	
			<b>Number of plants</b>						
V <sub>1</sub>	58	3.27	46	-	-	-	-	-	12
V <sub>2</sub>	664	37.41	91	552	-	-	-	-	21
V <sub>3</sub>	616	34.59	29	119	456	-	-	-	12
V <sub>4</sub>	266	15.38	4	96	72	89	-	-	5
V <sub>5</sub>	101	5.41	2	13	52	12	22	-	0
V <sub>6</sub>	58	3.27	-	-	38	7	5	7	1
V <sub>7</sub>	5	0.28	-	-	3	2	-	-	0
V <sub>8</sub>	6	0.34	-	-	-	4	1	1	0
V <sub>9</sub>	1	0.06	-	-	-				

-V<sub>3</sub> - from 616 mother-plant bulbs which represented 34.59 %: 29 progenies have generatively developed one bud, 119 progenies have generatively developed 2 buds, 456 progenies have generatively developed 3 buds and 12 progenies have vegetative developed (fig. 22);

-V<sub>4</sub> - from 266 mother-plants bulbs which represented 15.38 %: 4 progenies have generatively developed one bud, 96 progenies have generatively developed 2 buds, 72 progenies have generatively developed 3 buds, 89 progenies have generatively developed 4 buds and 5 progenies have vegetative developed (fig. 23);

-V<sub>5</sub> - from mother-plant bulbs which represented 11.32 %: 2 progenies have generatively developed one bud, 13 progenies have generatively developed 2 buds, 52 progenies have generatively developed 3 buds, 12 progenies have generatively developed 4 buds and 22 progenies have generatively developed 5 buds (fig. 24);

-V<sub>6</sub> - from 58 mother-plant bulbs which represented 3.27 %: 38 progenies have generatively developed 3 buds, 7 progenies have generatively developed 4 buds, 5 progenies have generatively developed 5 buds, 7 progenies have generatively developed 6 buds, a progeny has vegetative developed (fig. 25);

-V<sub>7</sub> - from 5 mother-plant bulbs which represented 0,28 %: 3 progenies have generatively developed 3 buds, 2 progenies have generatively developed 4 buds (fig. 26);

-V<sub>8</sub> - from 6 mother-plant bulbs which represented 0.34 %: 4 progenies have generatively developed 4 buds, a progeny generatively developed 5 buds, a progeny generatively developed 6 buds (fig. 27);

-V<sub>9</sub> - 1 mother-plant bulb has generatively developed in its progenies 9 buds (fig. 28).

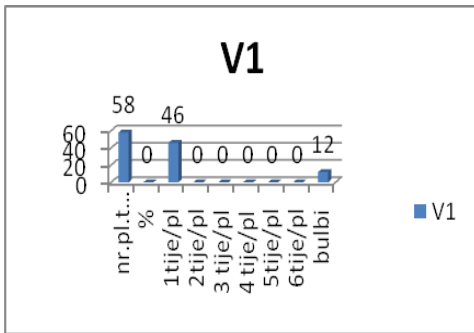


Fig. 20 DV<sub>1</sub>

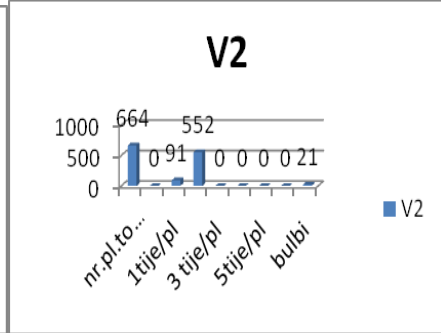


Fig.21 DV<sub>2</sub>

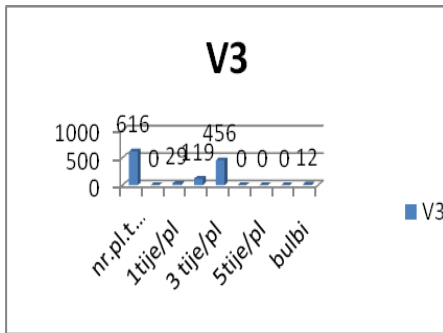


Fig. 22 DV<sub>3</sub>

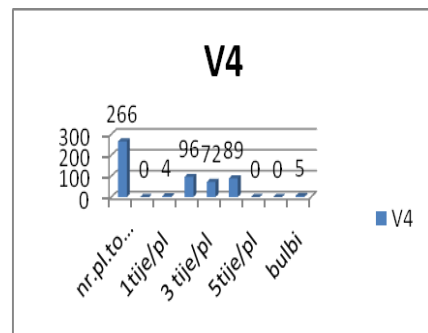


Fig.23 DV<sub>4</sub>

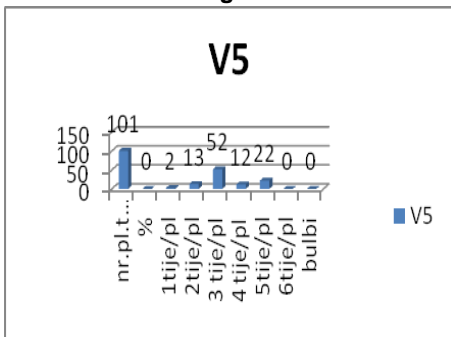


Fig.24 DV<sub>5</sub>

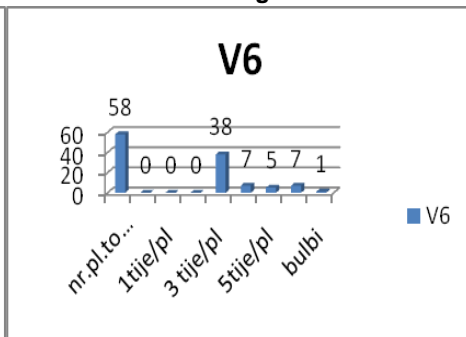


Fig.25 DV<sub>6</sub>

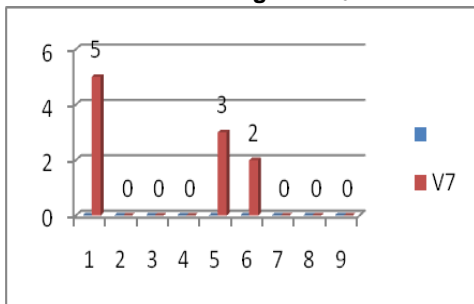


Fig.26 DV<sub>7</sub>

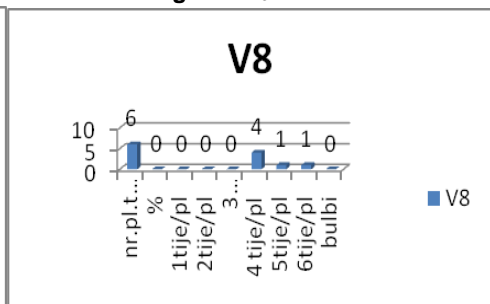


Fig.27 DV<sub>8</sub>

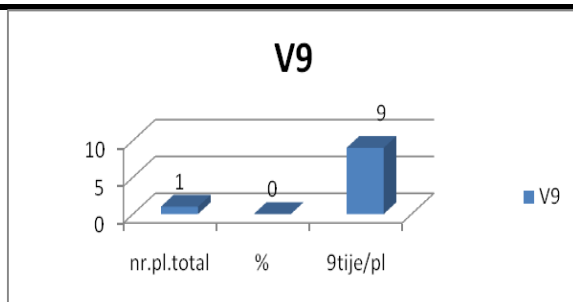


Fig.28 DV<sub>9</sub>

From the experimental E field, 1167 of seed-tree plants which have held in a field of study of the descending biological material on the vegetative and generative development of buds, where results (tab. 5, fig. 29, fig. 30, fig. 31, fig. 32, fig. 33, fig. 34, fig. 35):

-V<sub>1</sub> - from 97 seed-tree plants which represented 8.32 %: 81 progenies have generatively developed one floral rod and 16 progenies have vegetative developed resulting bulbs (fig. 29);

-V<sub>2</sub> - from 438 seed-tree plants which represented 36.88%: 71 plants have issued a floral rod, 352 plants have issued 2 floral rods and 15 plants have developed buds which have turned into bulbs (fig. 30);

-V<sub>3</sub> - from 430 plants which represented 36.71 %: 17 plants have issued a floral rod, 89 plants have issued 2 floral rods, 314 plants have issued 3 floral rods and 10 plants have vegetative developed forming bulbs (fig. 31);

-V<sub>4</sub> - from 132 plants which represented 11.32 %: 4 plants have issued a floral rod, 33 plants have issued 2 floral rods, 35 plants have issued 3 floral rods and 60 plants have issued 4 floral rods (fig. 32);

Table 5

**Vegetative and generative development of the buds of the seed-tree plants- experimental E field**

Variant	No. of seed-tree plants		Number of rods/plant (generative development)						-T (vegetative development)	
	total	%	1	2	3	4	5	6		
			Number of plants							
V <sub>1</sub>	97	8.32	81	-	-	-	-	-	16	
V <sub>2</sub>	438	36.88	71	352	-	-	-	-	15	
V <sub>3</sub>	430	36.71	17	89	314	-	-	-	10	
V <sub>4</sub>	132	11.32	4	33	35	60	-	-	0	
V <sub>5</sub>	42	3.60	-	2	19	5	-	-	16	
V <sub>6</sub>	24	2.06	-	-	20	4	-	-	0	
V <sub>7</sub>	3	0.26	-	-	1	1	1	-	0	

-V<sub>5</sub> - from 42 plants which represented 3.60% : 2 plants have issued 2 floral rods, 19 plants have issued 3 floral rods, 5 plants have issued 4 floral rods and 16 plants have formed bulbs (fig. 33);

-V<sub>6</sub> - from 24 plants which represented 3.60%: 20 plants have developed 3 floral rods, a plant have developed 4 floral rods and a plant have developed 5 floral rods (fig. 34);

-V<sub>7</sub> - from 3 plants which represented 0.26%: a plant has developed 3 floral rods, a plant has developed 4 floral rods and a plant has developed 5 floral rods (fig. 35).

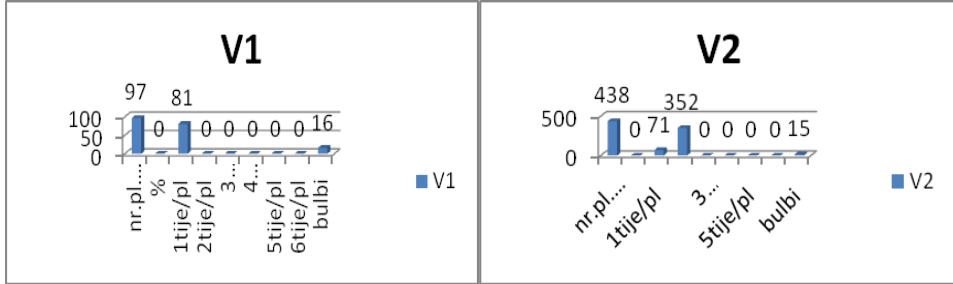


Fig. 29 EV<sub>1</sub>

Fig. 30 EV<sub>2</sub>

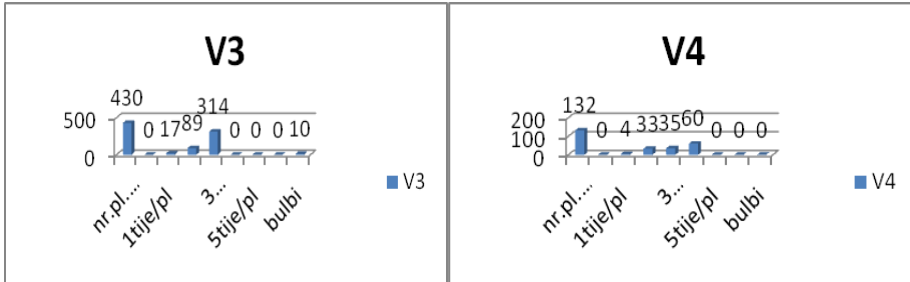


Fig. 31 EV<sub>3</sub>

Fig. 32 EV<sub>4</sub>

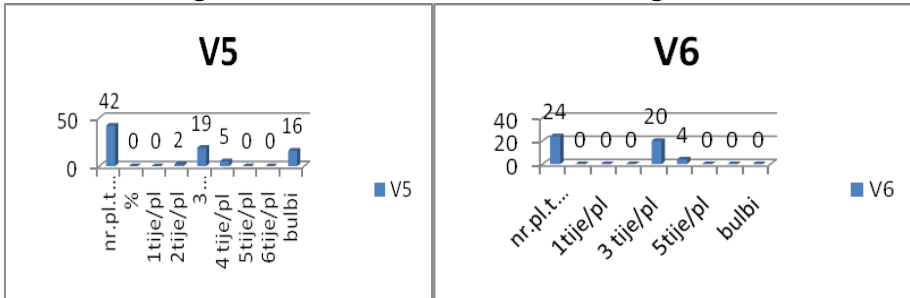


Fig. 33 EV<sub>5</sub>

Fig. 34 EV<sub>6</sub>

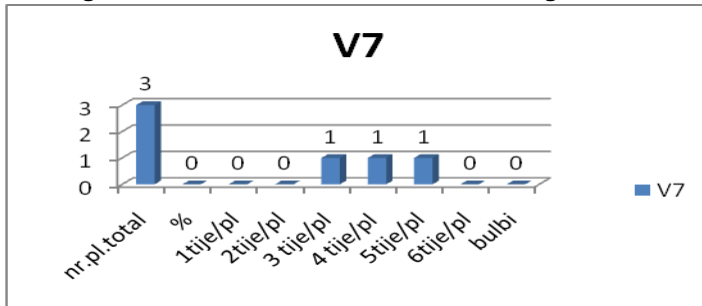
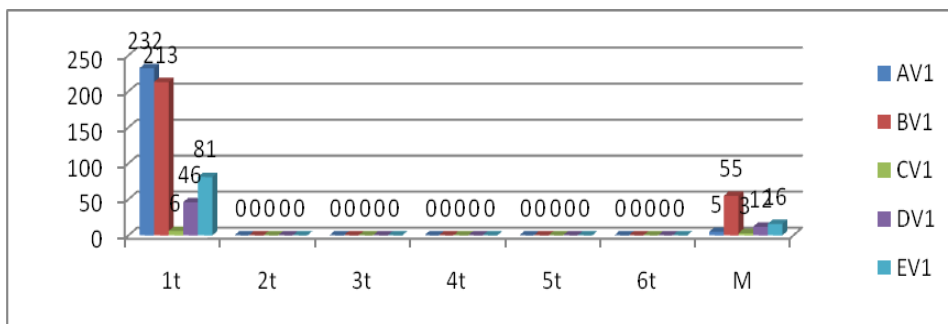
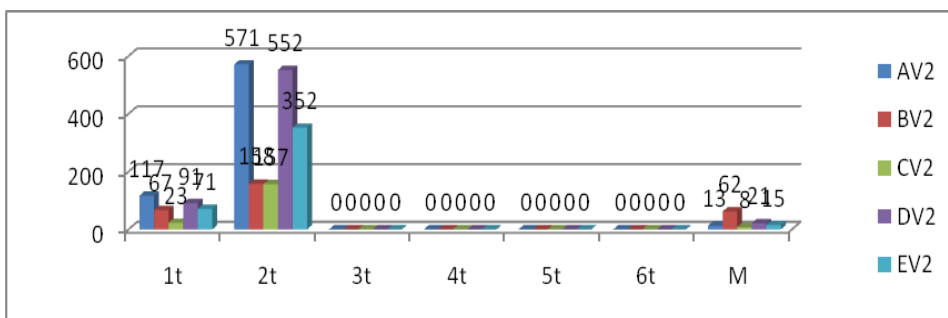


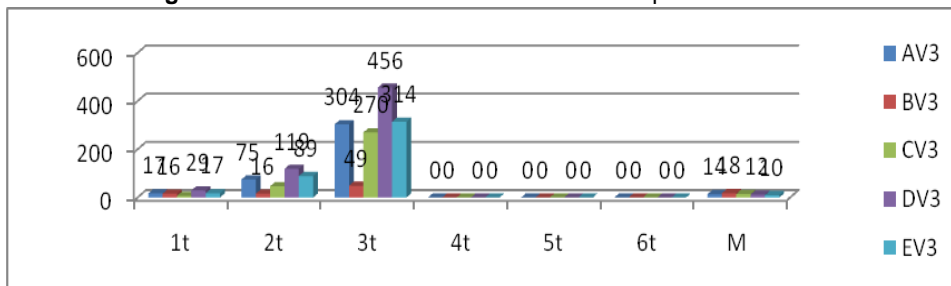
Fig. 35 EV<sub>7</sub>



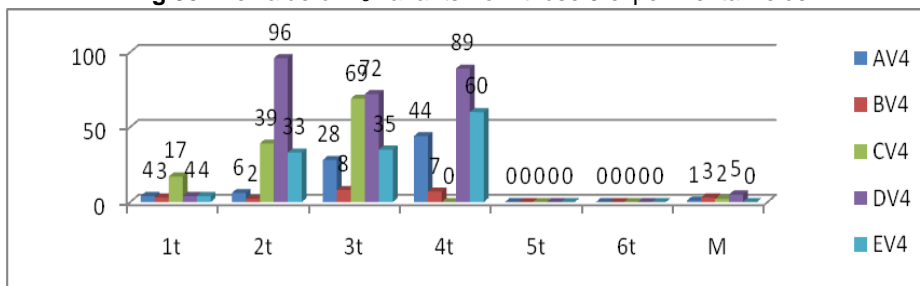
**Fig.36** The value of V<sub>1</sub> variants from those 5 experimental fields



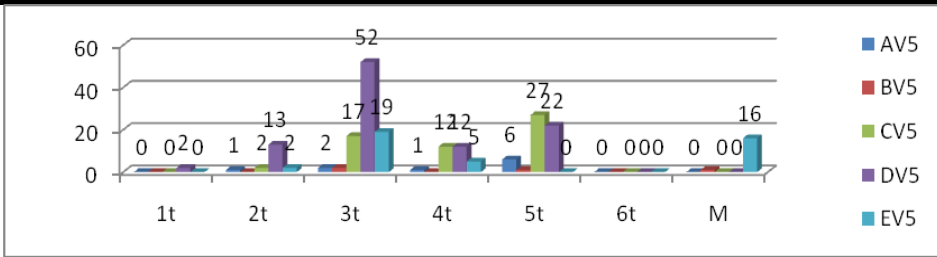
**Fig. 37** The value of V<sub>2</sub> variants from those 5 experimental fields



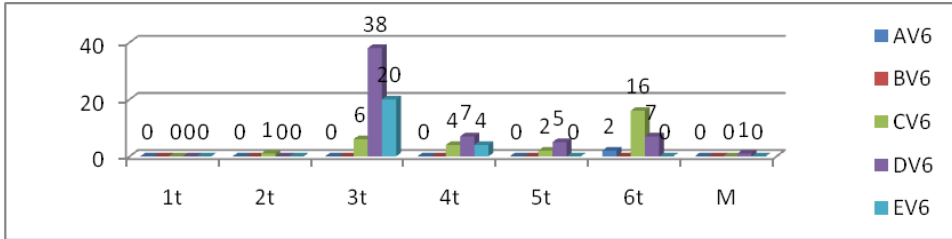
**Fig.38** The value of V<sub>3</sub> variants from those 5 experimental fields



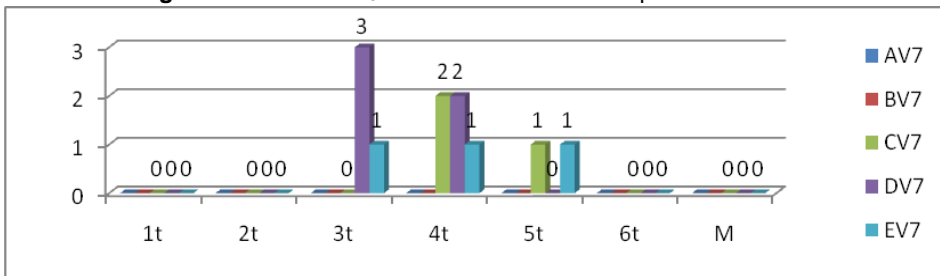
**Fig.39** The value of V<sub>4</sub> variants from those 5 experimental fields



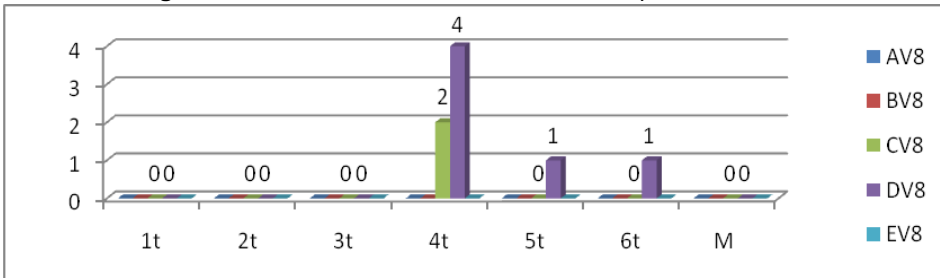
**Fig.40** The value of  $V_5$  variants from those 5 experimental fields



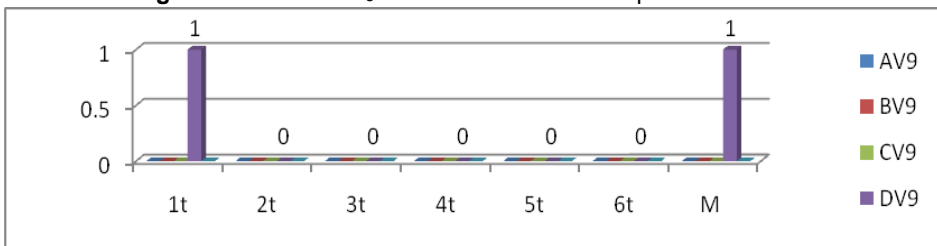
**Fig.41** The value of  $V_6$  variants from those 5 experimental fields



**Fig.42** The value of  $V_7$  variants from those 5 experimental fields



**Fig.43** The value of  $V_8$  variants from those 5 experimental fields



**Fig.44** The value of  $V_9$  variants from those 5 experimental fields



Fig. 45 Onion variety – Diana

In the year 2019, under laboratory conditions, it has studied the relationship between the number of buds developed inside mother-plant bulbs and the transversal diameter of the bulb (fig. 46).

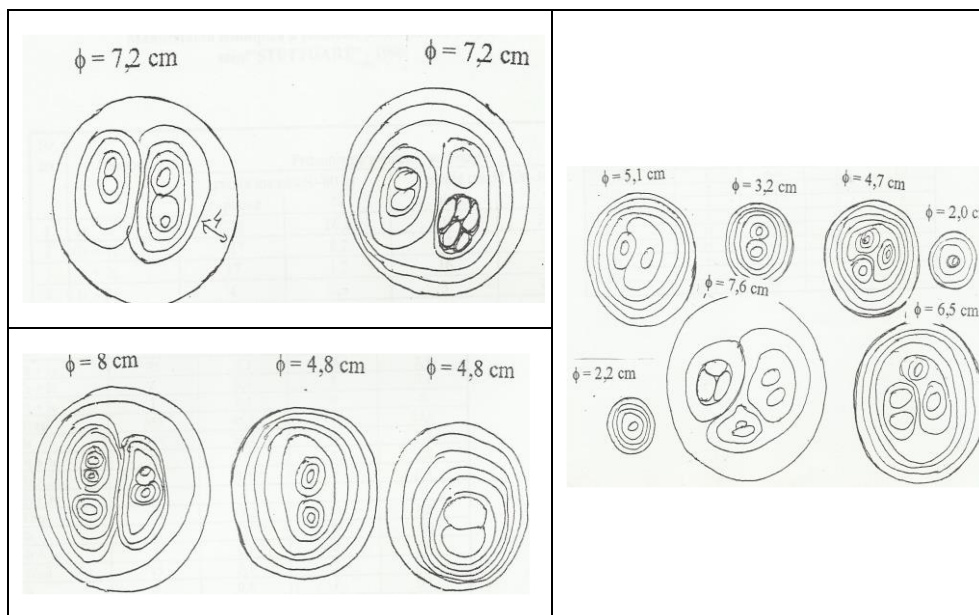


Fig. 46 The transversal diameter of the mother-plant bulbs, the number of developed buds/bulb and their location in bulb

## CONCLUSIONS

1. The bulb weight has directly influenced the generative development of the number of bud, as follows:

- in the experimental A field, where were used bulbs between 50-80 g/bulb: 97.71 % of buds have recorded a generative development by developing floral rods and 0.29 % from buds registered a vegetative development giving rise to bulbs and not to floral rods;

- in the experimental B field, where have been used bulbs between 20-30 g/bulb: 79.59 % of the budshave recorded a generative development by developing floral rods and 20.41 % of the buds have seen a vegetative development giving rise to bulbs and not to floral rod.

2. The more the bulb diameter is higher the more increases the total number of buds/bulb.

3. In the selection links of conservative selection, the percentage of buds with generative development has been approximately the same (96.29% - experimental C field, 97.12 % in experimental D field and 95.11 % in experimental D field, the rest of buds registered a vegetative development, forming bulbs and not the floral rods).

4. In the experimental E field, which represented a seed-tree field held in second year, the seed-tree plants have developed generative buds in proportion of 95.11 % and vegetative buds from where have resulted, 4.89 %.

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