

# Effect of Phosphorous Fertilizer on the Functioning and Functioning Component of “Brassica Napusl (B.N.) in Rain Fed Agriculture, in Different Groups Phosphorous Soil Fertility

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## ABSTRACT

To understand the effect of phosphorous fertilizer on the function and functioning components of “Brassica napusl (B.N.)” Hayola No. 401 in rain fed agriculture in different groups of phosphorous soil fertility 16 tests in 4 different areas have been conducted and in each area 4 tests in 4 groups of phosphor usable in the soil ( less than 3 ppm, 6-10 ppm and more than 10 ppm) in the form of blocks have been done completely randomly in 4 different fertilizers treatment ( 0, 25, 50, 75, kilo grams of p<sub>2</sub>o<sub>5</sub> in hectare). Triple super phosphate resources have been used in 4 repetitions for two agricultural years (2018-2019). Results obtained show that phosphorous fertilizer treatment in all groups of fertilizing soil have no meaningful effect on the seeds functioning, number of saddlebags, number of seeds in the saddlebag, weight of each 1000 seeds.

**Keywords:** Canola; Phosphorus; Function; Components Functioning

## Introduction

“Brassica napusl” is oil producing plant which plays important role in the human nutrition with its oil production, and it also has an important role in the food for animals and birds [1]. This plant contains more than 40% oil in its seeds and about 40% protein in its meal and that is why this plant is considered very important [2-4]. High amount of oil contamination in canola and also suitable corrected acidic fat mixture cause its dominance in the world market. Since, more than 90% of the country’s eating oil is imported from abroad, therefore it is important to value this plant [4]. Sandhu, et al. [5] reported in their research shortage of phosphor caused stop in the growth and formation of reproductive organs and grows very slowly and therefore the plant is short in branches and the number of saddles, weight in every 1000seeds.

Majumdar and Sandhu[5]reported that the phosphor fertilizer in the number of seeds in saddle, weight of 1000 seeds has been increased a little but their results did not have any effect in the increase of the functioning. Holmes, et al. [6-7] showed in their research that phosphorous seeds very rarely have high effects on the rape seed’s function and the height of this effect depend on the amount of phosphor in the soil. In Indian soil it has been reported that the phosphorous fertilizers have positive reaction on the functioning and functioning component but its 3effect is little [5,8-10]. Sajed, et al. [1] in an analysis on the Zucchini with thin layer seeds reported that using of phosphorous fertilizer caused increase in the number of lateral shoots, functioning, number of fruit and the amount of seeds production.

## Materials and Methods

The test has taken place in Behbahan in southeast of Khozistan state with the longitude 12', 15° east and latitude of 36', 30° north and the height of 320 meters from the sea level. Behbahan is an area with semi deserted climate which located in hot steppe climate. Average of rainfall and 10 years temperature is equal to 313.5 millimeters and 25 degrees centigrade respectively. To understand the effect of phosphorus fertilizer on the functioning and sub functioning of component of canola in the rain fed agriculture in different groups of soil phosphorous fertilizing, 16 tests have been conducted in 4 areas. In each area 4 tests in 4 groups of phosphorus usable in soil (less than 3ppm, between 3-6ppm, between 6-10ppm and more than 10ppm) have been repeated in 4 treatments of phosphorous fertilizer in the form of complete random block (0, 25, 50, 75 k.g. p2 o5 in hectare) from the triple super phosphate. It means that in each group of soil fertilizing by the amount of phosphate used in the soil for test in the form of complete random block plan in 4 treatments of phosphoric fertilizer in 4 repetitions. The space between these 4 areas are about 35 to 50 kilo meters and the space from the fields to each area was between 3 to 5 kilometers therefore each test consists of 16 terraces. Each terrace with the length of 5 meters with 8 implant lines with 30 centimeters space between them and the space between the bushes on each row was 5 centimeters, the space of terraces in relation to each other in each side was 1.5 meter and the repetitions space also was 1.5 meter. The date of implanting was fixed on the date of the first rainfall in the autumn in the area. Hayolla 401 was used in the test. Method of cultivation was serial and the amount of used seeds was 8 kilograms in hectare. In all the treatments 60kg/ha pure nitrogen (1/2 base +1/2 at the time of shooting (stemming) from the urea source and 50 kilograms of K2 O in each hectare from the potassium sulfate were used as the base. Gain for removal after ripening of saddlebags from an area equal to (1.5\*4 meters or 6 meters) from each terrace was

done and seed's functioning has been determined at the moisture of 10%in hectare. The numbers of bushes in unit, number of seeds in saddlebag, number of saddlebag in bush in unit and the weight of one thousand seeds were measured. In this research MSTAT software was used for statistical analysis. Comparisons of averages have been conducted according to LSD test. Variance analyses of 2 agricultural years have been conducted according to composite variance analysis.

## Results and Discussion

### Functioning and Functioning Components

Results of composite variance analysis of 2 agricultural year on the functioning and functioning components showed less than 3 percent ppm in the fertilizing group of phosphorous soil which shows that the effect of phosphorous fertilizer's treatment on the seed, saddle, number of seeds in the saddle and weight of 1000 seeds isn't meaningful but the mutual effect (area \*fertilizing group) on the seed functioning is meaningful (Table 1). Results obtained from (Table 2) for comparison of fertilizer treatment with witness treatment according to "LSD" test show that there isn't a meaningful difference through the seed functioning, number of saddle, number of seeds in saddle and thousand seeds weight between witness treatment with the fertilizing and all are located in one group. In 3-6 ppm soil phosphor of fertilizing group, effects of phosphorous fertilizer treatment on the seed functioning, number of saddles, number of seeds in a saddle and weight of 1000 seeds could be found which was not meaningful. The mutual effect (phosphorous fertilizer \* fertilizing group) of this group on the seed functioning is meaningful but, on its components, it isn't meaningful and mutual effect (areas \* fertilizing group) on the seed functioning is meaningful (Table 3). According to LSD test there isn't a meaningful difference between phosphorous fertilizer treatments with phosphorous fertilizer with witness treatment (Table 4).

**Table 1:** Compound variance analysis functioning and functioning component rape in fertility group soil absorption phosphorus < 3ppm.

Change Sources	Degree Freedom	Mean squares			
		Number of sheaths in shrub	Number of seed in sheath	Weight of each 1000 seed	Seed function
Year	1	5833/45**	44/325**	12/8 **	4277604/6**
Repetition×Year	6	121/80 ns	21/74 na	0/161*	3240/56**
Area(A)	3	151/82 ns	11/64 ns	0/25*	1507516/49**
Year× Area	3	97/21 ns	56/42 ns	0/15 ns	1152406/94**
Error(A)	18	177/23 ns	18/57	0/05	8014/36
Soil Phosphorus Fertility Groups(B)	3	95/01 ns	185/46**	1/04 **	183076/48**
Fertility Groups ×Area	3	121/04 ns	13/18 ns	0/24 **	251156/88**
Area × Fertility Groups	9	45/55 ns	13/25 ns	0/08 ns	95461/87**
Year × Area × Fertility Groups	9	40/16 ns	17/15ns	0/17*	196235/26**

Error(B)	72	47/29 ns	17/75	0/69	8070/44
Phosphorus Fertilizer Treatment (C)	3	41/3 ns	17/82 ns	0/94 ns	64128/50 ns
Phosphorus Fertilizer Treatment × Year	3	40/17 ns	17/46 ns	0/92 ns	83367/05ns
Area× Phosphorus Fertilizer	9	33/22 ns	14/35ns	0/76 ns	68947 ns
Area× Phosphorus Fertilizer × Year	9	43/19 ns	18/69 ns	0/98 ns	89631/1 ns
ErrorC1	36	45/12 ns	18/84	1/08	9363/2
Fertility Groups ×Phosphorus Fertilizer	9	33/41 ns	14/35 ns	0/75 ns	69317 ns
Phosphorus Fertilizer×Fertility Groups × Year	9	43/42 ns	18/70 ns	0/98 ns	90112/1 ns
Area× Group × Phosphorus Fertilizer	27	12/15 ns	5/43 ns	0/29 ns	19122 ns
Area× Group × Phosphorus Fertilizer × Year	27	24/16 ns	10/43 ns	0/54 ns	49717 /2 ns
Error C2	108	15/04	6/95	0/36	3121/07
(CV %)		18/16	21/7	8/23	9/08

**Table 2:** The mean comparison two-year, number of sheath bags, number of seeds in the sheath, weight of each 1000 seeds, seeds functioning, in phosphorus deferment treatments, in regions with fertility (<3ppm) for applied test (L.S.D).

Phosphorus Fertilizer Treatment Kg / Ha	Region1	Region2	Region3	Region4	Regions mean
<b>Number of Sheath</b>					
0	28 a	30 a	29 a	29 a	29 a
25	28 a	36 a	33 a	29 a	36 a
50	44 a	44 a	41 a	41 a	40 a
75	39 a	39 a	39 a	40 a	38 a
<b>Number of Seeds in the Sheath</b>					
0	a 28	a 32	a 32	a 31	a 30
25	a 25	a 24	a 28	a 27	a 26
50	a 44	a 27	a 27	a 26	a 26
75	a 39	a 27	a 26	a 24	a 25
<b>Weight of Each 1000 Seeds (gr)</b>					
0	a 55/2	a 44/2	a 55/2	a 5/2	a 51/2
25	a 47/2	a 58/2	a 55/2	a 54/2	a 52/2
50	a 35/2	a 44/2	a 55/2	a 39/2	a 40/2
75	a 43/2	a 5/2	a 3/2	a 45/2	a 42/2
<b>Seeds Functioning (kg/ha)</b>					
0	a 25/455	a 25/337	a 524	a 523	a 460
25	a 5/333	a 499	a 5/461	a 378	a 418
50	a 373	a 5/396	a 55/442	a 25/410	a 5/405
75	a 75/367	a 25/464	a 75/428	a 466	a 432

**Note:** The effect treatment no significant for properties no mention amount (L.S.D).

**Table 3:** Compound variance analysis functioning and functioning component rape in fertility group soil absorption phosphorus between 3-6ppm.

Change Sources	Degree Freedom	Mean squares			
		Number of Sheath in Shrub	Number of Seed in Sheath	Weight of Each 1000 Seed	Seed Function
Year	1	**14/7000	**18/322	**44/13	** 32/4020948
Repetition×Year	6	ns 16/146	ns 52/21	* 169/0	** 13/3046
Area(A)	3	ns 18/182	ns 52/11	* 26/0	** 5/1417065
Year× Area	3	ns 65/116	ns 86/55	ns 16/0	** 5/1083262
Error(A)	18	68/212	38/18	052/0	5/7533
Soil Phosphorus Fertility Groups(B)	3	ns 01/114	**60/183	**09/1	** 89/172091
Fertility Groups ×Area	3	ns 25/145	ns 05/13	*252/0	** 45/236078
Area × Fertility Groups	9	ns 66/54	ns 12/13	ns084/0	** 16/89734
Year × Area × Fertility Groups	9	ns 19/48	ns 98/16	ns 179/0	** 14/184461
Error(B)	72	75/56	*57/17	724/0	21/7586
Phosphorus Fertilizer Treatment (C)	3	ns 56/49	ns 46/17	ns99/0	ns 79/60280
Phosphorus Fertilizer Treatment × Year	3	ns20/48	ns 28/17	ns97/0	ns 03/78365
Area× Phosphorus Fertilizer	9	ns 86/39	ns 21/14	ns 80/0	ns 18/64810
Area× Phosphorus Fertilizer × Year	9	ns 83/51	ns 50/18	ns03/1	ns 23/84253
ErrorC1	36	14/54	63/20	134/1	41/8801
Fertility Groups ×Phosphorus Fertilizer	9	ns 09/40	ns 21/14	79/0ns	ns 98/65157
Phosphorus Fertilizer×Fertility Groups × Year	9	ns 1/52	ns 51/18	ns 03/1	ns 4/84705
Area× Group × Phosphorus Fertilizer	27	ns 58/14	ns 38/5	ns 30/0	ns 7/17974
Area× Group × Phosphorus Fertilizer × Year	27	ns 00/29	ns 32/10	ns 57/0	ns 17/46734
Error C2	108	05/18	88/6	38/0	81/2933
(CV %)		4/21	04/17	64/8	54/8

**Table 4:** The mean comparison two-year, number of saddle bags, number of seeds in the saddlebags, weight of each 1000 seeds, seeds functioning, in phosphorus deferment treatments, in regions with fertility (3-6ppm) for applied test (L.S.D).

Phosphorus Fertilizer Treatment kg / ha	Region1	Region2	Region3	Region4	Regions mean
<b>Number of Sheath</b>					
0	48 a	43 a	46 a	46 a	46 a
25	33 a	38 a	36a	34 a	35 a
50	43 a	45 a	43 a	43 a	44 a
75	45 a	45 a	44 a	42 a	44 a
<b>Number of Seeds in the Sheath</b>					
0	a 28	a 26	a 29	a 27	a 28
25	a 25	a 30	a 27	a 24	a 27

50	a 24	a 27	a 27	a 27	a 26
75	a 22	a 27	a 25	a 24	a 25
Weight of Each 1000 Seeds (gr)					
0	a 68/2	a 52/2	a 64/2	a 64/2	a 62/2
25	a 65/2	a 58/2	a 71/2	a 59/2	a 63/2
50	a 45/2	a 60/2	a 45/2	a 53/2	a 51/2
75	a 55/2	a 6/2	a 62/2	a 46/2	a 56/2
Seeds Functioning (kg/ha)					
0	a 415	a 5/481	a 25/441	a 25/441	a 75/444
25	a 75/265	a 75/480	a 5/351	a 5/351	a 4/326
50	a 57/259	a 25/393	a 25/339	a 25/399	a 333
75	a 421	a 574	a 75/466	a 75/466	a 482

The composite variance analysis in phosphorous fertilizer treatment absorbable in the soil during two years showed ppm of between 6 to 10. The effect of phosphorous fertilizer treatment and the mutual effect in this group (phosphor fertilizer \* fertilizing group) on the functioning and its components was not meaningful. But mutual effect (areas \* fertilizing group) on the seed functioning was meaningful. On one hand according to LSD test there wasn't a meaningful difference between fertilizing treatments with witness treatment in the group. (Tables 5 & 6). In phosphorous soil of fertilizing group of more than 10 ppm results of composite variance analysis for two agricultural years were shown. Phosphorous fertilizing treatment and their mutual effect (phosphor fertilizer \*

fertilizing group) on the seed's functioning was meaningful. (Table 7). Results of table 8 show that there isn't a difference between phosphorous fertilizing treatment with a witness treatment according to LSD test. Considering the results of the test, it can be said that phosphorous fertilizer very rarely have much effects on the seed functioning of Brassica napuls. on the other hand, some of the soil specifications such as organic materials, moisture and the amount of phosphor absorbable in the soil are effective. In the soil with higher amount of organic materials and more suitable moisture the functioning is difference in relation to witness treatment even though it isn't meaningful.

**Table 5:** Compound variance analysis functioning and functioning component rape in fertility group soil absorption phosphorus 6-10ppm.

Change sources	Degree freedom	Mean squares			
		Number of Sheath in Shrub	Number of seed in sheath	Weight of each 1000 seed	Seed Function
Year	1	** 19/9275	** 42/312	** 93/12	** 5/5133125
Repetition×Year	6	ns 66/193	ns 87/20	* 163/0	** 67/3888
Area(A)	3	ns 39/241	ns 17/11	* 252/0	** 79/1809019
Year× Area	3	ns 56/154	ns 16/54	ns 151/0	** 3/1382888
Error(A)	18	79/281	83/17	05/0	23/9617
Soil Phosphorus Fertility Groups(B)	3	ns 06/151	** 04/178	** 05/1	** 78/219691
Fertility Groups ×Area	3	ns 45/192	ns 65/12	* 24/0	** 26/301388
Area × Fertility Groups	9	ns 42/72	ns 72/12	ns 08/0	** 24/114554
Year × Area × Fertility Groups	9	ns 85/63	ns 46/16	* 172/0	** 31/235482
Error(B)	72	19/75	04/17	70/0	53/9684
Phosphorus Fertilizer Treatment (C)	3	ns 67/65	ns 11/17	ns 95/0	ns 2/76954
Phosphorus Fertilizer Treatment × Year	3	ns 87/63	ns 76/16	ns 93/0	ns 46/100040
Area× Phosphorus Fertilizer	9	ns 82/52	ns 78/13	ns 77/0	ns 4/82736
Area× Phosphorus Fertilizer × Year	9	ns 67/68	ns 94/17	ns 99/0	ns 3/107557
ErrorC <sub>1</sub>	36	74/71	01/20	ns 09/1	84/11235
Fertility Groups ×Phosphorus Fertilizer	9	ns 12/53	ns 78/13	76/0ns	ns 4/83180

Phosphorus Fertilizer×Fertility Groups × Year	9	ns 04/69	ns 95/17	ns 99/0	ns 52/108134
Area× Group × Phosphorus Fertilizer	27	ns 32/19	ns 21/5	ns 29/0	ns 4/22946
Area× Group × Phosphorus Fertilizer × Year	27	ns 41/38	ns 01/10	ns 54/0	ns 64/59660
Error C2	108	91/23	67/6	36/0	28/3745
(CV %)		4/22	52/16	31/8	9/10

**Table 6:** The mean comparison two-year, number of saddle bags, number of seeds in the saddlebags, weight of each 1000 seeds, seeds functioning, in phosphorus deferment treatments, in regions with fertility 6-10ppm for applied test (L.S.D).

Phosphorus Fertilizer Treatment kg / ha	Region1	Region2	Region3	Region4	Regions mean
<b>Number of Sheath</b>					
0	57 a	55 a	58 a	59 a	57 a
25	54 a	51 a	54 a	59 a	54 a
50	66 a	69 a	68 a	65 a	67 a
75	52 a	47 a	49 a	52 a	50 a
<b>Number of Seeds in the Sheath</b>					
0	a 27	a 28	a 28	a 26	a 27
25	a 25	a 27	a 27	a 25	a 26
50	a 23	a 24	a 25	a 25	a 24
75	a 27	a 27	a 26	a 26	a 24
<b>Weight of each 1000 Seeds (gr)</b>					
0	a 59/2	a 4/2	a 6/2	a 63/2	a 5/2
25	a 47/2	a 45/2	a 48/2	a 54/2	a 48/2
50	a 37/2	a 46/2	a 44/2	a 53/2	a 45/2
75	a 49/2	a 58/2	a 55/2	a 55/2	a 54/2
<b>Seeds Functioning (kg/ha)</b>					
0	a 25/449	a 25/547	a 709	a 75/661	a 592
25	a 75/303	a 25/569	a 25/553	a 25/555	a 4/495
50	a 75/306	a 25/527	a 75/526	a 75/505	a 467
75	a 25/476	a 497	a 75/511	a 75/526	a 503

Note: The effect treatment no significant for properties no mention amount (L.S.D).

**Table 7:** Compound variance analysis functioning and functioning component rape in fertility group soil absorption phosphorus over >10 ppm.

Change sources	Degree freedom	Mean squares			
		Number of Sheath in Shrub	Number of Seed in Sheath	Weight of Each 1000 Seed	Seed Function
Year	1	**2/10325	**39/286	**90/11	** 72/6245302
Repetition×Year	6	ns 59/215	ns 13/19	* 15/0	** 22/4731
Area(A)	3	ns 72/268	ns 24/10	* 23/0	** 07/2200974
Year× Area	3	ns 06/172	ns 65/49	ns 14/0	** 13/1682514
Error(A)	18	70/313	34/16	05/0	96/11700
Soil Phosphorus Fertility Groups(B)	3	ns 06/151	** 04/178	** 05/1	** 78/219691
	3	ns 17/168	**20/163	**97/0	** 7/267291

Fertility Groups × Area	3	ns 24/214	ns 60/11	*22/0	** 04/366689
Area × Fertility Groups	9	ns 62/80	ns 66/11	ns 074/0	** 33/139374
Year × Area × Fertility Groups	9	ns 08/71	ns 09/15	ns 16/0	** 48/286503
Error(B)	72	70/83	62/15	64/0	84/11782
Phosphorus Fertilizer Treatment (C)	3	ns 10/73	ns 68/15	ns87/0	ns 61/93627
Phosphorus Fertilizer Treatment × Year	3	ns 10/71	ns 36/15	ns85/0	ns 89/121715
Area× Phosphorus Fertilizer	9	ns 80/58	ns 63/12	ns 71/0	ns 62/100662
Area× Phosphorus Fertilizer × Year	9	ns 45/76	ns 45/16	ns91/0	ns 41/130861
ErrorC1	36	86/79	34/18	1	27/13670
Fertility Groups × Phosphorus Fertilizer	9	ns 04/69	ns 95/17	ns 99/0	ns 52/108134
	9	ns 13/59	ns 63/12	70/0ns	ns 82/101202
Phosphorus Fertilizer× Fertility Groups × Year	9	ns 85/76	ns 46/16	ns 91/0	ns 67/131563
Area× Group × Phosphorus Fertilizer	27	ns 50/21	ns 78/4	ns 27/0	ns 12/27918
Area× Group × Phosphorus Fertilizer × Year	27	ns 76/42	ns 18/9	ns 50/	ns 11/72587
Error C2	108	62/26	09/6	33/0	76/4556
(CV %)		41/19	14/15	65/7	26/13

**Table 8:** The mean comparison two-year, number of sheath bags, number of seeds in the sheath, weight of each 1000 seeds, seeds functioning, in phosphorus deferment treatments, in regions with fertility (over 10ppm) for applied test (L.S.D).

Phosphorus Fertilizer Treatment kg / ha	Region1	Region2	Region3	Region4	Regions mean
<b>Number of Sheath</b>					
0	64 a	63 a	66 a	69 a	66 a
25	50 a	49 a	52 a	55 a	52 a
50	94 a	90 a	93 a	76 a	88 a
75	46 a	44 a	50 a	48 a	47 a
<b>Number of Seeds in the sheath</b>					
0	a 23	a 23	a 22	a 21	a 22
25	a 22	a 23	a 21	a 21	a 22
50	a 22	a 23	a 22	a 22	a 22
75	a 30	a 29	a 26	a 26	a 28
<b>Weight of Each 1000 Seeds (gr)</b>					
0	a 71/1	a 81/1	a 93/1	a 08/2	a 88/1
25	a 24/2	a 28/2	a 24/2	a 39/2	a 29/2
50	a 7/2	a 51/2	a 56/2	a 55/2	a 58/2
75	a 4/2	a 41/2	a 43/2	a 46/2	a 43/2
<b>Seeds Functioning (kg/ha)</b>					
0	a 5/471	a 528	a 5/596	a 5/6535	a 4/563
25	a 5/402	a 75/443	a 75/457	a 486	a 444
50	a 685	a 5/758	a 25/851	a 724	a 755
75	a25/828	a 694	a 5/734	a 75/629	a 737

The amount of phosphor absorbable in soil in group of (3-6) and (6-10) ppm in relation to phosphor group absorbable (less or very high) has suitable effect on the seed functioning. In some of the soil phosphor fertilizing group (medium or high), the amount of fertilizing phosphor, number of saddles and weight of 100 seeds increases a little but their 3effect on the seed functioning is not

enough in research on the Brassica napuls plant it has been reported that phosphorous fertilizer does not increase the seed functioning but the height of the plant, number of intial subshrubs and number of saddles will increase a little and also the phosphorous fertilizer has no effect on the number of seeds and weight in 1000 seeds. Mojumdar and Sandhu [5] reported that phosphorous fertilizer

increases the number of seeds and weight of 1000 seeds a little. But their results have no effects on the increment of seed function. Holmes and Ainsley [7-8] mentioned that the phosphorous fertilizer very rarely causes effects on the B.N seed functioning and its effect depends on the amount of phosphor in the soil.

In India regarding the effect of phosphorous fertilizer on the function and its components no positive reaction was noticed. The reason for it is due to the soil condition. Singh, et al [9-14] regarding Indian soil reported that the phosphorous fertilizers have positive effect on the functioning and its components, but it is a little. On research on the medical plant of paper seed pumpkin reported that more phosphorous fertilizer showed the number of seeds in the bush, weight of dried seed in bush and maximum weight of dried seed in each square meter. Also, the use of phosphorous fertilizer causes increase in the number of lateral shoots, functioning and the number of fruit and amount of medical pumpkin seed's production [1,15].

## Conclusion

Different treatment of phosphorous fertilizer in all groups of soil phosphorous fertilizing have no meaningful effect on the functioning and functioning component of B.N. (number of saddles, number of seeds in the saddle and weight of 1000 seeds.

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## Conflict of Interest

All authors declare that there is no conflict of interest in this work.

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