Optimal Design of Cultivation Factors for Purple Pepper

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Abstract: China's pepper breeding has a long history, and through a long time of efforts in the quality and yield of the effect is very obvious. At present, China's pepper planting resources are moving forward in the direction of high quality, variety and abundance. In recent years, improved varieties of pepper have been innovating, so how to choose their varieties and improve the yield of pepper according to local conditions has always been the concern of vegetable farmers. The factor that has the greatest influence on the yield of pepper is the cultivation factor, and the basic unit that has the most important influence on the growth and development of pepper is photosynthesis, which is also the key index for rational screening of the cultivation factors of pepper. Specific research on different cultivation factors can improve the productivity and quality of pepper.

1. Introduction

The combination yield and yield composition of pepper include development degree, fruit number, fruit volume, fruit weight, etc. After the above factors are counted, the economic benefits are calculated, and then the appropriate characteristic pepper can be completed for further experiments. After the experiment selected purple pepper plant yield is suitable for production and used to calculate the chili pepper fruit dry weight values, such as in the content of soluble sugar and soluble protein indicators are suitable for measuring, the densitometer cultivation factors affecting factors of the fixed value to make it after the study of the influence of hot pepper production can be found that the effect on the photosynthetic pigments and photosynthetic indexes measuring after come to the conclusion that the actual technical route, see figure 1.[1-4]

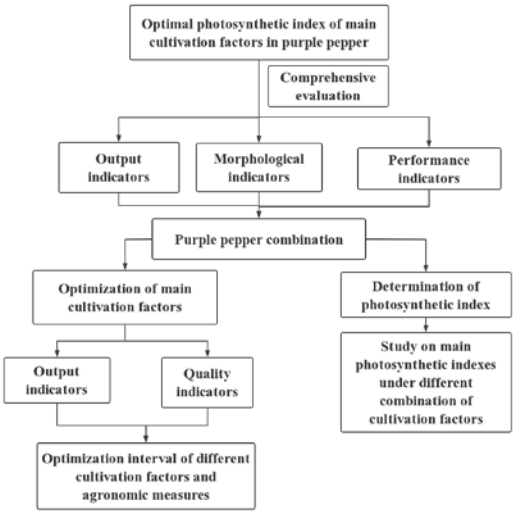

Fig.1 Technical Route

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2. Experimental Design

2.1 Test Materials

Purple pepper was selected as the experimental species in this experiment, and details of different pepper combinations were shown in Table 1 below. Purple peppers are known for their resistance to epidemics and viral diseases, as well as their ability to withstand high temperature drops and high light sources. The above characteristics can not only reduce the frequency of pesticide use and reduce environmental pollution, but also ensure the safety of pesticides when they are sold as commodities. There are many factors that can influence of cultivation factors on pepper production, in the midst of this article is the purple pepper as experimental varieties to study the optimal factor, in order to complete the purple pepper fruit production and nutrition research, thus the optimal factor combination, in the actual plant for application in order to enhance the production and cultivation area.[5-7]

Number	Code	Plan color Number	Number	Code	Plan color Number
1	FL-2×1111PYTZR-1-2-2	purple	l1	1117FL-2	green
2	FL-5-1×1111PYTZR-1-2-4	purple	12	1117×FL-6	green
3	FL-2×1131-2-4-1-3	purple	13	1117×FL-8	green
4	1127-1×FL	purple	14	1126-1×FL	green
5	111 1-1g-2-2-8xFL	green	15	151401YF×1131-2-4-1-1	purple
6	1111PYTZR-1-2-1×FL-5-1	purple	16	161128-1PZR-X-1-2×FL	purple
7	1111P-1-1×FL-2	purple	17	171128-1PZR-X-1-3×FL	purple
8	1115ZR-1×CP-10-4	purple	18	1115ZR-1	green
9	1117×1111	green	19	1121P-1-2-1	purple
10	1121P-1-2-4xFL	purple			

Table 1 Different Pepper Combinations

2.2 Experimental Design

In this paper, in the process of designing the experiment, 19 different pepper varieties were selected from the seedling beds in a completely random way, and the selected varieties were marked at the same time. Ten plants of each variety were taken and planted in the greenhouse. A total of 19 different treatment combinations were used in the experiment, with each patch length of 200cm, width of 1200cm and area of 24m2. Each bed was seeded in double rows, 50cm apart, with the same moisture conditions.

In the process of this randomized experiment, the designed regression orthogonal rotation combination content includes density, fixed value, boron fertilizer and other factors, which are 2, 1, 0, -1, -2 respectively in the horizontal setting, and the total number of treatment combinations is 36. The order of each bed is randomly arranged, the length of the bed is 2500cm, and the width is 100cm. The spacing between the two rows should be 50cm. Organic cake fertilizer and compound fertilizer were used as basic fertilizers, nitrogen fertilizer was fixed and boron fertilizer was routinely used in the budding stage. Water and pest control should be carried out during conventional cultivation.

The test data are the mean value, the mean value formula:

$$\bar{x} = \frac{x_1 + x_2 + \ldots + x_n}{n} = \frac{\sum_{i=1}^{n} x_i}{n}$$

In the process of comprehensive classification of the results of quality grading standards in accordance with hot pepper production requirements set follow, in order to complete the purple pepper important quality appraisal, and complete comprehensive score according to the actual situation after processing the measured value occupies the percentage of the total score is the actual first, in the first of which is a perfect product of the indicators of its score value, thus it can

complete the composite scores determine the full marks are divided into soluble protein respectively 10 points, soluble sugar of vitamins 20 points, 10 points, anthocyanins 20 points, single fruit weight 20 points, total soluble solids 20 points.

3. Establishment of Quadratic Regression Model

In the process of multiple regression analysis based on the actual situation of the experiment, the yield of the bed and the planting time can be obtained according to the combination design method. The specific function model is detailed as follows:

$$Y_1 = 2114.42518 + 217.66000x_1 + 203.33679x_2 + 149.92432x_3 + 174.59923x_4 + 190.89140x_5$$
$$-129.43839x_1x_2 + 9.82503x_1x_3 + 212.28617x_1x_4 + 3.64000x_1x_5 + 3.62458x_2x_3 + 3.62458x_2x_3$$
$$-26.91510x2x_4 - 36.04891x_2x_5 - 105.57330x_3x_4 - 90.79726x_3x_5 - 79.43148x_4x_5 - 153.58988x_1^2$$
$$-149.79758x_2^2 - 151.07554x_3^2 - 146.63824x_4^2 - 155.50704x_5^2$$

In order to complete the relationship between the yield of pepper and the change rate of the increase and decrease of each factor level, it is necessary to complete the construction of the mathematical model and consolidate its variables at the level of 0. Thus, the equation of marginal effect of the single factor and the productivity of pepper is obtained as follows:

$$dy_1 / dx_1 = 217.66000 - 307.17976x_1$$
$$dy_2 / dx_2 = 203.33679 - 299.59517x_2$$
$$dy_3 / dx_3 = 149.92432 - 302.15108x_3$$
$$dy_4 / dx_4 = 174.59923 - 293.27648x_4$$
$$dy_5 / dx_5 = 190.89140 - 311.01408x_5$$

Visible data respectively has a density of x1, x2 planting time, x3 boron fertilizer, x4 organic cake fertilizer and x5 nitrogen, which is the relationship between the capacity has the most clear change and x5 nitrogen, in respect of impact on the capacity influence with the size of the column order for x5 > x1 > x3 > x2 > x4, and when the various variables in a low condition when the production efficiency is greatly influenced by the opposite smaller, when the above factors beyond the scope of appropriate, its comprehensive capacity effect is reached negative in continuously reduce eventually.[8-10]

4. Results and Analysis

According to the results in Table 2, it can be found that different pepper combinations have great differences in yield, and the yield of combinations that can reach 1800kg consists of 3, 5, 18, 9 and 1. Among them, purple pepper combination 1 has the least production capacity, which is 1278.38kg/667m2. After the variance method

$$\left(\hat{y} - \bar{y}\right)'\left(\hat{y} - \bar{y}\right)$$

After calculation, it was shown that the combination of sowing purple pepper (FL-2× 1111pytzr-1-2-2) could yield the maximum yield.

Combination number	Yield per plant		Mean of yield per plant	Yield (kg/667m2)
	1	2		
9	1497.87	1448.46	1473.17	3890.83±92.28aA
1	911.55	840.51	876.03	2313.71±132.67bB
18	687.20	865.90	776.55	2050.97±333.73cBC
3	769.52	743.28	756.40	1997.75±79.00cdbCD
5	722.05	700.14	711.10	1878.11±40.92cdeCDE
16	655.13	661.52	659.33	1738.73±11.94cdefCDEF
15	609.63	651.83	630.73	1665.84±78.81fghDFGH
4	649.12	589.21	619.17	1635.31±111.89fghDEFGH
8	541.77	670.97	606.37	1601.5±241.29ghiEDFGH
6	564.43	638.63	601.53	1588.72±138.57ghiEFGH
2	577.64	550.69	564.17	1490.04±50.33ghijFGHJ
10	558.05	548.21	553.13	1460.89±18.38ghijkFGHI
17	562.35	536.91	549.63	1451.64±47.51jijkFGHI
19	499.45	521.40	510.43	1348.11±40.99ijkGHI
7	448.42	518.11	483.27	1276.38±130.15ikHIJ
12	447.67	464.32	456.00	1204.35±31.10KIJK
14	373.79	363.35	368.57	973.44±9.501mJKL
11	314.77	354.22	334.50	883.46±73.67mnKL
13	241.97	255.63	248.80	657.11±25.51nL

Table 2 Effects of Different Pepper Combinations on Pepper Yield

It can be clearly found from Table 3 that there is a clear difference in the number of fruits of different combinations, among which the most and least combinations are 19 and 13 respectively, and the number of fruits is 47 and 13 respectively. When sown with purple pepper, combination 19 produced the most fruit.

Combination number	Plant height	Plant development	Number of fruit	Maximum fruit weight	Fruit length	Fruit width
6	93.7a	52.00ab	29bcd	29.20dcfg	15.56efg	2.64def
16	88.7ab	48.70ab	42ab	21.76ij	13.84fgh	2.31efgh
9	88.0ab	60.60ab	38ab	55.83a	12.60h	4.77a
2	87.8ab	56.29ab	29bcd	28.56defg	16.17def	2.62defg
1	81.6abc	60.35ab	34abc	38.09c	16.36def	3.31b
17	75.7abcd	47.57ab	34abc	23.20hi	14.5efgh	2.26fgh
11	74.1abcd	47.50b	18cde	28.31efg	22.05a	2.29efgh
10	71.6abcde	54.86ab	33abc	27.10fgh	19.81abc	2.33efgh
4	68.6bcde	59.55ab	28bcde	31.09def	15.62efg	2.740dc
12	67.6bcde	45.58b	20cde	33.01d	18.50bcd	2.76cd
7	63.1cde	48.70ab	20cde	32.25de	13.00gh	3.37b
13	60.1cde	50.65ab	13c	26.28ghi	18.91bcd	2.51defg
8	59.8cde	54.54ab	32abd	24.77ghi	16.47def	2.35defg
19	59.5cde	48.54ab	47a	16.01k	14.59efgh	1.91b
5	58.2cde	46.88b	17de	58.36a	12.73h	5.13a
18	56.5dc	60.33ab	43ab	25.14ghi	17.14cde	2.33efgh
15	54.1def	47.92ab	33abc	25.78ghu	18.43bcd	2.21fgh
3	48.7ef	65.19a	27bcde	44.61b	20.67ab	3.11bc
14	34.1f	45.50b	27bcde	18.08jk	14.06fgh	2.19gh

Table 3 Effects of Different Pepper Combinations on Pepper Growth

5. Conclusion

Through this experiment can be found, in the environment of greenhouse cultivation through the

study of the combination of hot pepper varieties has obvious differences in yield and economic benefit, the differences were reflected in the number of fruits, plant height, maximum fruit weight and determination of the mention of the fruit, which can be found in hot pepper varieties has obvious difference is the factor of yield components. After the correlation analysis, it was found that the above factors were positively correlated with their constituent factors and were not significantly correlated with the difference of plant height and fruit field. After the production capacity and economic benefits are calculated, the total production capacity and economic benefits can be obtained. The results can prove that the production capacity and economic benefits of different varieties are different. In summary of the above results, the dog can find that when the purple fruit is produced, its productivity combination is the largest and the economic benefit is the highest, while when the green fruit is produced, its plant height is the highest, and the number, volume and spread degree of fruit are significantly different, and the yield is the highest and the economic benefit is the highest.

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