CONFECTIONERY SUNFLOWER IN CHINA AND AGRONOMIC CHARACTERS OF MAIN CULTIVAR

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Confectionery sunflower, one of the important cash crops in semiarid and sand-wing region of China, is widely grown covering an area fo 80% of sunflower which had been cultivated. The coefficient of variance and the ranges of variance of the main phenotypic agronomic characters of 124 varieties and lines what we use today have been shown in the paper. The proper order of C.v.from large to small are hundred seed weight, plant height, seed length, stem diameter, leaf number, head diameter, protein content in seed, husk percentage and days of growth. It was calculated that plant height was 202.5 cm ± 37.27, stem diameter was 2.82 cm ± 0.34, leaf number was 29.0 ± 3.43 hundred sead weight was 10.44 ± 2.81, seed length was 1.82 ± 0.95 head diameter was 20.85 cm ± 1.98, days of growth was 96.63 ± 3.13 and husk percentage was 43.68 % ± 4.01. for the most cultivated confectionery sunflower varieties.

Yield comparison of eleven cultivated sufnlower varieties showed significant or highly significant difference among most of them. The highest yielding variety nearly doubled the lowest yielding one. And this showed the necessity and the possibility of employing fine varieties in production today in China.

Introduction

Sunflower was introduces to China about early seventies century. On the'qun fan pu ' which is a chinese book report that it was called 'xi pen lian'or' zhang ging', perhaps it has introduced into Europe then it had been spread to China.

Although sunflower has been planted small areas many years age and nearly all country was planted after introduction of confectionery sunflower. Ecological types in the difference regions were formed gradually, because of planting confection sunflower in garden long time. Until the sixties, following oilseed sunflower has spreaded widely in over the world and planted areas of sunflower had expanded in China and planting area of sunflower was planed by the Chinese goverment in 1979.

Confectionery sunflower production ocoupies an important place in the chinese production of sunflower. Sunflower production areas were distributed to Northerne region of China such as yellow river old valley Northeast part of China, northern part in Xin Qand province as well as southern part of China is sall areas planted.

According to incomplate statistics, in Northease three provinces anda 87.97 ha. in wich confection sunflower area occupied more than 80% . Total plant sunflower areas were 31.79 ha at Hi Long Jiang province in 1985, among them confection holded over 85%. At Pa Meng region in Nei Monggol sold confectionery sunflower seeds one hundred seven thousands five million kilogramme in 1985. Confectionery sunflower is a rich nutrition food which contains protein and potossium, iron, sodium higher than other grains. It becomed important economic crop at Northern part of China.

Performece of agronomic character

According to the use, confection sunflower is one type that belong to the cultivated sunflower (H.annuus L.). Due to difference of economic purpose, peopie has demanded a different for the types of sufnlower. It is well know that confection sunflower kernel has a higher content protein and higher hull ration, but oilseeds sunflower contrarily. To understand total situation of agronomic character of confectio sunflower, and to confirm suitable for select standard of

character so that will offer some breeding materials. Present trial used 124 cultivar of confection sufnlower which were introduced from over China in 1983-1985. The trial was conducted at Ma Guan Qiao, DOng Ling, Shenyang, in 1984-1985. The 124 cultivars were sown in plots that consisted of three rows with 5. Om long and 0.6 m wide apart. The type of soil was loam clay. The following characters were measured and recorded, date of emergence, budding, flowing, mature; plant height, stem diameter, head diameter, number of leaves, 1000 seed weight, kernel, percentage, seed protein content and yield of plot. Data in table 1 and table 2 shown the results tested.
Supplement trial of yield comparison were conducted with 11 cultivars in 1985. The testing used randomized complete block with three replicating. Each plot consisted of 4 rows which was 10 m long and 0.6 m. wide apart. There are 10 plant was calculated and analysis of variance were conducted as well as yield difference comparisons.

Results and discussion

1. Data in table 2 shown a relativo magnituded of variance range each character of phenotype and among them variance. Magnitudes of variation coefficient of 9 mainly agronomic characters were successively 1000 seed weight > plant height > seed lengh > stem diameter> number of leaves> head diameter> protein percentage in seed > kernel percentage > day of growth.

2. On the data in table 1.2. understanded a total situation of mainly agronomic characters for present confectionery sunflower cultivar. Its plant height was 202.5 $\pm$ 37.27 cm, stem diameter was 2.82 $\pm$ 0.34 cm, number of leaves was 29.0 $\pm$ 3.43, 1000 seeds weight was 10.44 $\pm$ 2.81 g, seed lengh was 1.82 $\pm$ 0.95 cm, head diameter was 20.85 $\pm$ 1.98 cm, days of growth was 96.66 $\pm$ 3.13, kernel percentage was 56.32 $\pm$ 4.01, protein percentage in seed was 24.2 $\pm$ 2.56.

Table 1 - Agronomic charactersof main cultivars of confection sunflower

province	cultivar	date of sown	date of emergence	date of budding	date of flowing	date of maturity	plant height cm	stem diameter cm	number of leaves	head of diameter cm	1000 seed g	seed length cm	date of growing	kernel percentage %	protein in seed %
NeiMoggol	valley ke	15.Ap.	28.Ap.	13.Ju.	29.Jul.	31.July	138	2.36	29.2	19.5	132	1.74	95	57	37.6
Hei lei giang	hei zui cui hua ke	19.Ap.	4.May	22.ju	13 Jul	7.Aug.	245.	2.9	29.7	25.3	129	1.9	101	52.3	30.5
		19.Ap.	4.May	17.ju	12 Jul.	8.Aug.	224.0	3.2	33.6	23.6	138	1.8	96	59.0	34.0
Ji Lin	chang ling ke hun	15.Ap.	30.AP.	16.Ju	8.Jul.	5.Aug.	215.0	3.98	37.0	17.0	120	1.7	97	64.0	37.6
	nanke	15.Ap.	10.May	18.Ju	17.Jul.	8.Aug.	210.0	3.6	35.5	18.0	70	1.8	100	62.0	35.4
Liaoning	fu xin ke	19.Ap.	4.May	23.Ju	17.Jul.	13.Aug	233.	2.98	32.9	19.0	81	1,76	102	54,0	31.5
	jin ping-gke	23.Ap.	7.may	19.Ju	17.Jul	10.Aug	211	3.61	30	19.7	68	1,59	96	63,0	32.2
He Bei	zi kua hua	23.Ap.	4.May	16.Ju.	8.Jul.	12.Aug	216	2.6	29.1	16.8	100	1,82	98	51,1	37.7
	cheng deke	23.Ap.	8.May	18.Ju.	16.Jul.	11.Aug	228	3.17	32.4	20.0	90	1,9	96	55,3	33.5

Table 2 - Field record and agronomic character statistics of planting 124 confection sunflower in 1984-85

Character		value of lowest and highest		average		dirrerence of standard		variance coeficient	
		84	85	84	85	84	85	84	85
1000 seed weight	g	5.8-19.7	4.0-16.9	11.71	9.17	2.85	2.77	24.41	30.24
plant height	cm	12.7-27.2	134-265	191.6	213.5	37.4	37.2	19.5	17.4
seed length	cm	1.3-2.3	0.96-2.2	1.86	1.78	1.66	0.24	12.4	13.45
stem diameter	cm	1.28-3.6	2.2-3.6	2.74	2.90	0.37	0.32	13.61	11.30
number of leaves		19.0-45	23.7-35.2	29.0	29.0	4.2	2.66	14.15	8.91
kernel percentage	%	45.0-69	51.1-61	65.2	56.46	5.03	2.99	8.96	5.44
seed protein percent.	%	16.36-24.9	17.67.21.8	19.6	19.73	2.09	3.03	10.65	11.70
head diameter	cm	16.0-3.0	16.8-23.1	21.57	20.13	2.66	1.30	12.33	6.48
date of growing		92-105	88-103	98.0	95.33	3.48	2.79	3.55	2.92.

Table 3- comparision of differences in 11 cultivar yield

cultivar	kg/ha	average yield in plot kg									
ke 1	2013.8	6.04									
ke 2	1930.5	5.79	0.25								
ke 3	1580.2	4.74	1.3**	1.05*							
ke 4	1467.0	4.4	1.64***	1.39**	0,34						
ke 5	1430.3	4.29	1.75**	1.50**	0,45	0,11					
ke 6	1430.3	4.29	1.75**	1.50**	0.45	0.11	0.0				
ke 7	1331.5	4.01	2.03**	1.76**	0.73	0.39	0.28	0.28			
ke 8	1280.3	3.84	2.02**	1.95**	0.90	0.56	0.45	0.45	0.17		
ke 9	1246.5	3.74	2.3**	205**	1.00	0.66	0.55	0.55	0.27	0.10	
ke 10	1096.5	3.29	2.75**	2.50**	1.45**	1.11**	1.00**	1.00**	0.72	0.55	0.45
ke 11	101o.3	3.03	3.01**	2.76**	1.71**	1.37**	1.26**	0.98*	0.81*	0.71	0.26

L.S.D 0.05 = 0.78 *

L.S.D 0.01 = 1.06 ***

3. Yielding comparison data in table 3 has indicated yielding heigh cultivars is twice fold heiger than the yield of lower cultivar. A Number of present cultivars were a significant of yielding comparison differece. On the preceding character performance. We can know that present cultivar yield was a lower level, good agronomic characters and excellent yield confection cultivars were needed in the sunflower production recently. Prosent trial given that it is possibility to select excellent cultivar.