Studied on the Appropriate Sowing Dates of Sunflower Crops in Xinjiang

Chen fulong Li wanyun
Xie zongming Chen yinchu Duan wei

Field Crops Research Institute
XinJiang Academy of Agriculture and Reclmamtion Sciences(China)

ABSTRACT

The growth and development of sunflower crops was slow which sown in April, due to low temperature of prophase in this month. The growing period of sunflower early sown in April was longer than that of sunflower late sown in April and its plant height was shorter , number of leaives was less. Their yields were high which sown before the first ten-day period of June except for sowing date in the first ten-day period of May because the flowering time of sunflower would easy meet bad climate such as high temperature, rich rain and so on during that period, the setting percentage and yield would be decreased significantly by these bad climate. We found that sharply significant positive correlation between early or late sowing dates of sunflower crops and oil content. So the appropriate late sowing(in the last ten-day period of May) and the appropriate early sowing (in the middle ten-day period of April) of sunflower crops is the effective measures to realize its high yield, top quality and high benefit.

KEY WORDS sunflower crop sowing date growing period agronomoic character

INTRODUCTION

There have been lots of reports on the appropriate sowing dates of sunflower crops that early sowing can increase its production and oil percentage as well as improve oil ingredients at home and broad.

XinJiang farmers had experiences that sunflower crop productions were enhanced by late sowing , but that lacked scientific test data. Therefore,our objective was to examine the appropriate sowing date of sunflower crops in SHIHEZI region in XINJIANG,which both seed growing and oil production have a very important meanings.

MATERIALS and METHODS

Our experiments were conducted in SHIHEZI region.There were five sowing dates in 1994 and seven sowing dates in 1995.Tested variety was XINKUN hybirds 2 (our institute breeded a new variety).Five sowing dates in 1994 were 22 April,6 May,23 May, 9 June and 23 June; Seven sowing dates in 1995 were 6 April, 21 April, 6 May, 21 May,5 June and 5 July.Every other sowing date was at 15 days intervals. The experimental treatments were arranged in randomized blocks, tetrareplicates. The test plots row long was 10m.There were 12 rows in it.Spacing between rows was 0.6m .Spacing between plants was 0.25 m. A plot area was $72m^2$,equivalent to 66660 plants/ha . culture managements of this experiment blocks were the same as field sunflower crops. Investigating and recording the situations of sunflower growth and development were performed during the growing period. When harvesting , five plants were sampled from each plots to measure their characters.Each plot yield was weighed,separately.

RESULTS and ANALYSES

Effect of Different Sowing Dates on Growing Period

For different sowing dates each growing stages of sunflower crops required defferent number of days (Table 1). As the sowing dates were postponed from 6 April to 20 June, its growing period obviously became short from 104 days to 92 days. For sowing on 5 July due to high temperature of seedling stage,sunflower plants developed quickly,but as the climatic temperature decreased after floral initiation stage,number of days from flowering to maturing were prolonged. Number of days of the growing period for 5 July extended more six days than that of 20 June. As a result of low temperature of front growing stage of sunflower crops for sowing dates of April, its plants slowly growed and developed,number of days from sowing to

Table 1 Statistical table of growing stages of different sowing dates

sowing date	SS		SFI		FIF		FM		SM	
	ND	MDT ℃	ND	MDT ℃	ND	MDT ℃	ND	MDT ℃	ND	EAT ⩾5℃
6 April	13	13.2	43	18.6	25	24.3	40	25.8	121	2006
21 April	9	16.0	37	20.2	25	24.7	41	25.1	112	1978
6 May	7	19.1	35	21.4	24	27.1	41	24.8	107	2015
21 May	7	20.3	31	25.8	25	26.6	40	24.0	103	2052
5 June	6	24.5	31	26.0	24	24.8	40	22.2	101	1931
20 June	6	26.6	30	26.4	23	25.0	39	20.8	98	1848
5 July	6	28.7	31	24.7	25	23.8	41	16.9	102	1711
r	−0.8935**		−0.9652**		−0.2025		0.0281			

Note: SS=sowing to seedling
SFI=seedling to floral initiation
FIF=floral initiation to flowering
FM=flowering to maturing
SM=sowing to maturing
ND=number of days
MDT= mean daily temperature
EAT=effective accumulation temperature

seedling were 13-9 days,which were more 7-3 days than 5 June.Number of days from seedling to floral intiating were 43- 37 days,which were more 12-6 days than 5 June. The air temperature of seedling stage had a sharply significant negative correlation with continous days of that , their correlation coefficients (r) = 0. 8935 and(r)= 0.9652. The effect of sowing dates on growing period of sunflowe crops were mainly the stage from sowing to seedling and

seedling to floral intiating. Number of days from floral initiating to flowering and flowering to maturing were not largely influenced by sowing dates . Number of days from flowering to maturing for sowing on 5 July lasted 41 days, as mean daily temperature decreased to 16.9 ℃ after flowering on 4 September.

Effect of Different sowing Dates on Agronomic Character

The sowing dates of sunflower crops controlled its flowering time. The climatic conditions of flowering stage and thin seed- filling stage produced different effects on agronomic character of sunflower crops to some extent.According to F-test,this experiment conclusion showed that sowing dates had a little effect on stem diameter,disc seed weight and thousand kernel weight, but had a large effect on plant height, leaf numbers, disc diameter, setting percentage, oil content and yield. Their significant differences at level of $p=0.05$ and $p=0.01$ were detected,respectively.

Effect of Different Sowing dates on plant Character

Plant height , leaf numbers and disc diameter of sunflower were largely affected by sowing dates.Because of lower air temperature of seedling stage for sowing on 22 April and 6 May, their plants growed slowly. So plant height was shorter. Number of leaives was fewer, 178cm, 180cm and 29 leaives, 28 leaives, respectively. Because of high air temperature of seedling stage for sowing on 9 June sunflower plants growed fast,so its plant height was high, number of leaives was increased , they were 211cm and 33 leaives, respectively . Disc diameter had a significantly negative correlation with flower budding stage temperature ,its correlation coefficient(r)equals to -0.8236**.

Effect of Different sowing Dates on Setting Percentage

For sowing on 6 May sunflower crops flowered in the middle ten-day period of July. Its flowering time happened to the climatic conditions that there were many days of rich rainfall and the highest absolute temperature $\geqslant$ 35 ℃ , in this region , leading to only 70.7% of setting percentage. For sowing on 9 June, its flowering time appeared on 9 August. This climatic conditions suited for sunflower's flowering and pollinating , which there was not any days of the highest absolute temperature $\geqslant$35℃ , though there were seven rainy days , the amount of rainfall was only 1.6

mm. 84% setting percentage of this sowing date increased more 13.3

Table 2 Plant Character of Different Sowing Dates (1994-1995)

sowing date	PH (cm)	SD (cm)	NL	DD (cm)	DSW (g)	TKW (g)	OP (%)
22 April	178c	2.22	29b	15.6b	64.2	67.5	45.80a
6 May	180bc	2.31	28c	15.2b	58.7	64.8	44.45a
23 May	208a	2.39	31ab	15.7b	65.8	65.2	44.21a
9 June	211a	2.33	33a	16.3a	71.5	65.8	42.83ab
23 Jun	109ab	2.26	31ab	16.5a	67.7	63.9	40.03b

note :Values with the same appended letter do not differ at LSR(P=0.05)
PH=plant height
SD=stem diameter
NL=number of leaives
DD=disc diameter
DSW=disc seed weight
TKW=thousand kernel weight
OP=oil percentage

percent point than that of 6 May.Hence, the climatic conditions of flowering time directly affected setting percentage of sunflower crops (Table 3). There was a significant differences between them at significiant level of p=0.05.

Effect of Different Sowing Dates on Oil Content

As the air temperatures of the stage from flowering to maturing, which thin seed of sunflower was filling and seed oil ingredients were forming , were high , the acccmulations of sunflower seed oil ingredients became fast. With sowing dates be postponed, the air temperature of stage from flowering to maturing gradually descended so that oil accumulations of sunflower slowed down and its oil percentage decreased as well. When mean daily temperature

of the stage went down 20℃ below ,sunflower oil percentage of this sowing date was less.Such as sowing date on 23 June , mean daily

Table 3 Analyses table of setting percentage of Different sowing dates

sowing date	setting percentage	flowering stage		
	%	rainy days	fallrain (mm)	≥35℃ days
22 April	72.3	6	11.3	4
6 May	70.7	6	23.8	3
23 May	73.7	8	6.2	3
9 June	84.0	7	1.6	0
23 June	78.4	5	8.9	4

setting percentage F=3.41>F0.05=3.26

temperature of the stage from flowering to maturing was only 17.9℃, its oil percentage was 40.3%.It decreased more 2. 8 percent point than sowing date on 9 June, and 5.77 percent point than sowing date on 22 April. Therefore , sowing dates had a large effect on oil percentage of sunflower crops. The air temperatures from flowering to matuing correlated very well positively with oil percentage of that,its correlation coefficient(r)=0.8624" (table 2).

Effect of Different Sowing Dates on Yield

The sowing dates had a major effect on sunflower yield. The yield which sown on 23 May was the highest among all sowing dates (Table 4). The second was on 9 June and 22 April. Their productions were 3023.1 kg /ha, 2928.0 kg/ha and 2822.17 kg/ ha ,respectively .

There were no significant differences between the three. But their yields increased more 24.3, 20.4 and 16.1 percent than 23 June.The yield which sown on 23 May was also the highest ,the second was on 22 April, 1354.0 kg/ha, 1318.8kg/ha, respectively. Their oil yields

increased more 36. 2 precent and 32. 6 percent than 23 June, individually.

Table 4 Statistical table of yield of different sowing dates

sowing date	seed yield			oil yield		
	kg/ha	v.s control %	order	kg/ha	v.s control %	order
22 April	2822.7a	116.1	3	1318.8a	132.6	2
6 May	2332.9c	95.9	5	1042.8bc	104.9	4
23 May	3023.1a	124.3	1	1354.0a	136.2	1
9 June	2928.0a	120.4	2	1270.5ab	127.7	3
23 June (control)	2431.6b	100	4	994.5c	100	5

CONCULSION

In the natural conditions of SHIHEZI reclmamtion region , the flowering stage of the first ten-day or middle period of July of sunflower crops that sown in the first ten-day period of May happened to the air high temperature and rich rainfall . This serevely affected sunflower crops pollinating and bearing , leading to lower setting percentage and yield.We conluded that sunflower crops were appropriately late sown (in the last ten-day period of May) or early sown (in the first or middle ten-day period of April) to keep away high temperature and rich rainfall weather for the flowering time in planting region in order to increasing its setting percentage and oil content and yield.

As mentioned above . According to appearing dates of climatic anomalies of each year in planting region ,the flowering stage of sunflower crops should be placed in the most appropriate flowering

and pollinating climate under conditions that ensuring normal grade of maturing of that , and then according to the required days of seedling stage and floral initiation stage of sunflower crops, the reciprocal method was used to determine the most appropriate sowing dates. High yield and good quality of sunflower crops can be realized by adjusting its sowing date and flowering stage.