On-Farm Trial of Hybrid Sunflower

การทดสอบทานตะวันในแหล่งปลูกพืชเศรษฐกิจต่าง ๆ

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Abstract

Agronomic and varietal trials of sunflower hybrids have been carried out both by extension officers, researchers and farmers. The objectives of these trials have been.-

(1) to test adaptability of sunflower hybrids to different environments and (2) to examine whether hybrids tested are promising for extension program. Agronomic trials in farmers' fields at Petchaboon showed that tillage did not substantially affect sunflower grain-yield either with or without fertilizer. Of course, fertilized sunflower yielded greater than unfertilized one (352 VS 288 kg/rai). At Srisaket, no yield different between Hysun 33 and S.101 (perviously called G.101) was found (274 VS 257 kg/rai). In contrast, yields of Hysun 33, from farmers' fields, were 280-350 kg/rai at Namaow district and 140-210 kg/rai at Chondan district whereas S.101, at Wichienburi, yielded as low as 80-97 kg/rai. Lower yields of S.101 resulted from unsuitable soil for sunflower.

Varietal trials have also been conducted in six different research stations covering the two regions, the NE (3) and the N (3), Fertilizer treatments have been included as well in some of the stations. The seven-hybrids tested were Veraflor, Rustiflor, Maryflor, Cerflor, Topflor, S.101 and Hysun 33. The first five hybrids were from France and the last two hybrids were from the USA. and Australia, respectively. Results from the NE. were not incentive. Yields of sunflower ranged from 17.8-92.7, 89.3-234 and 69.6-96.9 kg/rai at Khonkaen, Srisaket and Mahasarakarm, respectively. Sunflower hybrids were not quite responsive to fertilizer, except for at Mahasarakarm, though averaged yields were low. A contrasting picture of the performance of sunflower hybrids was obtained from the N. region Grain yield of sunflower ranged from 31.1-205, 277-560 and 266.61-420 kg/rai at Chiangmai FCRC, CMU (Hysun 33 and S.101 excluded) and Sukhothai FCRS, respectively. Generally, Hysun 33 and S.101 yielded greater than the other hybrids in four out of six research stations. The results suggested that Hysun 33 and S.101 are the promising hybrids to be included in the extension program.

บทคัดย่อ

ได้มีการทดสอบปลูกทานตะวันสายพันธุ์ต่าง ๆ โดยเจ้าหน้าที่ส่งเสริม นักวิจัย และเกษตรกร โดยมีวัตถุประสงค์ดังนี้ :

1) เพื่อทดสอบความสามารถในการปรับตัวกับสภาพแวดล้อมต่าง ๆ ของทานตะวัน

2) เพื่อศึกษาว่าสายพันธุ์ใดเหมาะสมที่จะส่งเสริมต่อไป

จากการทดสอบในแปลงเกษตรกรที่จังหวัดเพชรบูรณ์พบว่า การไถพรวนไม่มีผลกระทบต่อผลผลิตเมล็ดทานตะวันมากนัก ทั้งในแปลงที่ใส่และไม่ใส่ปุ๋ย สำหรับในแปลงที่ใส่ปุ๋ยจะได้ผลผลิตสูงกว่าแปลงที่ไม่ใส่ปุ๋ย (352 vs 288 กก./ไร่) ส่วนในแปลงทดสอบที่จังหวัดศรีสะเกษพบว่าผลผลิตของสายพันธุ์ Hysun 33 และ S.101 (เดิมเรียก G.101) ไม่แตกต่างกัน (274 vs 257 กก./ไร่) แต่ในแปลงของเกษตรกรพบว่า ผลผลิตแตกต่างออกไป ที่อำเภอน้ำหนาว ผลผลิตของสายพันธุ์ Hysun 33 อยู่ระหว่าง 280-350 กก./ไร่ และที่อำเภอชนแดนอยู่ระหว่าง 280-350 กก./ไร่ ส่วนผลผลิตของสายพันธุ์ S.101 ที่อำเภอวิเชียรบุรีอยู่ระหว่าง 80-97 กก./ไร่ การที่ผลผลิตของพันธุ์ S.101 ต่ำเนื่องมาจากดินขาดความอุดมสมบูรณ์ และไม่เหมาะสมกับการปลูกทานตะวัน

ได้มีการทดสอบสายพันธุ์ทานตะวันในสถานีทดลองอีก 6 แห่งในภาคตะวันออกเฉียงเหนือ และภาคเหนือ โดยมีการทดลองการตอบสนองต่อปุ๋ยในบางแห่งด้วย พันธุ์ที่ทดสอบทั้ง 7 พันธุ์ได้แก่ Veraflor, Rustiflor, Maryflor, Cerflor, Topflor, S.101 และ Hysun 33 ทานตะวัน 5 พันธุ์แรกนั้นมาจากประเทศฝรั่งเศส ส่วนอีก 2 สายพันธุ์ได้มาจากประเทศสหรัฐอเมริกา และออสเตรเลีย ตามลำดับ ผลจากการทดสอบที่ภาคตะวันออกเฉียงเหนือนั้นให้ผลผลิตไม่ค่อยเป็นที่พอใจนัก กล่าวคือ ผลผลิตที่จังหวัดขอนแก่นอยู่ระหว่าง 17.8-92.7 กก./ไร่ ที่ศรีสะเกษได้ 89.3-234 กก./ไร่ และที่มหาสารคามได้ 69.6-96.9 กก./ไร่ ตามลำดับ นอกจากนี้ยังพบว่าทานตะวันพันธุ์ลูกผสมไม่ค่อยตอบสนองต่อปุ๋ย นอกจากที่มหาสารคามซึ่งก็ยังได้ผลผลิตที่จัดว่าต่ำ จากการทดสอบที่ภาคเหนือพบว่า ได้ผลที่แตกต่างกันอย่างมาก กล่าวคือ ผลผลิตของเมล็ดทานตะวันอยู่ในเกณฑ์ระหว่าง 31.1-205.0 กก./ไร่ ที่ศูนย์วิจัยพืชไร่เชียงใหม่ 277-560 กก./ไร่ ที่มหาวิทยาลัยเชียงใหม่ (ไม่รวมพันธุ์ Hysun 33 และ S.101) และ 266.6-420.0 กก./ไร่ที่ศูนย์วิจัยพืชไร่สุโขทัยตามลำดับ โดยทั่วไปแล้วพันธุ์ Hysun 33 และพันธุ์ S.101 ให้ผลผลิตสูงกว่าพันธุ์อื่น ๆ ในการทดสอบที่สถานีวิจัย 4 แห่ง เมื่อเทียบกับสถานีวิจัยที่ร่วมทดสอบทั้งหมด 6 แห่ง จึงอาจสรุปได้ว่า ควรแนะนำให้มีการนำพันธุ์ Hysun 33 และพันธุ์ S.101 ไปไว้ในแผนการขยายผลงานต่อไป

Background and rationale

Sunflower is a crop with promising potential as an economic oil crop in Thailand. Although open pollinated variety was introduced to Thailand ten years ago, the attempt to grow sunflower in large scale was not succeeded since the yield was very low. Several factors contributed to the failure, some of which were insufficient pollinators, and unstable of technology at farm level. Recently, a few hybrid varieties of sunflower were, again introduced to Thailand with the attempt to establish this crop as an economic oil crop. The researchers in various fields are now working on the trials in order to formulate an appropriate technology of sunflower production for farmer.

The trial

The Department of Agricultural Extension (DOAE) has concentrated on the study of hybrid sunflower for two years. In 1986, on-farm trial of hybrid sunflower was conducted in many locations throughout the country. The hybrid used in the trial was "Hysun 33", the imported hybrid from Australia, which was the only hybrid available for commercial scale then. The objective of the trial was to test the adaptability of the hybrid in various locations. The hybrid's yield obtained from the trial was as low as 375 to 1994 kg/ha.

In 1988, the DOAE has received five varieties of hybrid sunflower from Rustica Company in France. Combining with the former hybrid, Hysun 33 as S.101, the most recently imported hybrid from the USA, the trials were conducted both in farmers field an in research stations. There were two trials, agronomic and varietal trials. The objectives of the trials were two folds. One was to determine the growth and yield performance of two available commercial hybrids (Hysun 33 and S.101) under different tillage systems and fertilizer application. Another was to investigate the adaptability of 7 hybrids (five from France, namely Topflor, Veraflor, Cerflor, Maryflor and Rustiflor plus Hysun 33 from Australia and S.101 from the USA.) with the attempt to pick out hybrid (S) with good performance for extension program.

Materials and Methods

1. Tillage and Fertilizer Trials.

The split plot in RCB was used with 2 replications. Tillages with and no tillage were main plots and levels of fertilizer, with and without fertilizer were sub-plots. Sunflower was fertilized with 15-15-15 fertilizer at the rate of 156.25 kg/ha as basal fertilizer at the time of planting and top dressed with urea (46%) at the rate of 62.5 kg/ha.

2. Varietal Trials

Hysun 33 or S.101 was subjected singly to different tests in farmers' field to assess yield performance under farmer's management. The tests were not subjected to any statistical designs.

Another set replicated trials was exercised in Research station. Most of the trial contained 5 hybrids from France and H 33 and S.101. Some of trials included fertilizer levels as additional treatments. All trials were conducted using RCB design. And the data were not combined.

Locations

1. Farmers' field

1.1 Petchaboon province
1.2 Si Sa Ket province

2. Research Station

2.1 Khon Kaen province (Northeastern Regional Office)
2.2 Mahasarakam province
2.3 Sri-Sa Ket province
2.4 Sukhothai Field Crop Research Station
2.5 Chiangmai Field Crop Research Center
2.6 Chiangmai University

Result

The result from the agronomic trial revealed that there was no significance in yield difference between tillage and no-tillage treatment while the difference in yield between fertilizer levels (with fertilizer treatment was higher than without fertilizer) was noted (Table 1). This result indicated the need of fertilizer application in order to obtain resonable sunflower yield.

The varietal trial was divided into 2 parts. The first one was to compare the yield performance of 2 available commercial hybrids (S.101 and Hysun 33) in farmer's field in 2 provinces under farmers' operations. The land preparation and fertilizer used were the same as with tillage and with fertilizer as indicated in agronomic trial. Each variety was planted in 2.9 hectares. The

result indicated that Hysun 33 had higher yield than S.101. Thus Hysun 33 showed better crop adaptability than S.101.

The second part of varietal trial was conducted in 6 research stations. Three locations (Khon Kaen, Mahasarakam and Srisaket provinces) were operated by farmers under the supervision of extensionist, while the other three trial plots (in Sukhothai and Chiangmai Field Crop Research Stations and Chiangmai University) were operated by skill worker under researchers supervision. There were 7 hybrids used in the trial (5 from France, 1 from Australia and 1 from USA.) as mentioned before. The results revealed that Hysun'33 and S.101. Showed the best crop adaptability in terms of yield performance and plant growth through out the various environments. There was also a marked yield gap noted between sunflower yield in the trial under the unskill worker and skill worker (Table 3-7). This indicated the need of intensive care at the critical period of plant growth (i.e. the seedling establishment and during anthesis). However, it can concluded that S.101 and Hysun 33 were suitable for extension program at present since they showed good crop adaptation. Although some French varieties yielded greater than Hysun 33 and S.101 in some locations, they showed less crop adaptability than the two previous mentioned hybrids. Frence varieties need further on farm study.

Results

Tillage & Fertilizer Trial

Table 1 Mean yield of hybrid Sunflower under two tillage systems and fertilizer levels at Petchaboon

	−fert	+ fert	X	
Tillage	299	384	341.5	P.D. : 18/9/87 H.D. : 20/12/87
No-till	277	320	298.5	93 days
X	288	352		

Tillage : NS. Total Rainfall = 397 mm/s.
Fertilizer : *

Table 1/1 Performance of S.F. hybrids in Farmer's fields

Hybrid	Location	Yield	Rainfall (m.m.)				Total
			Aug.	Sept.	Oct.	Nov.	
H-33	Namnaow	280−350	384	332	125	76	917
H-33	Chondan	140−150	163	558	91	5	817
S-101	Wichienburi	80−97	142	426	132	64	764
H-33	Kantarluk	274					
S.101	Kantaraluk	257					

Fertilization 0 - 10 kg/rai (15-15-15)
Fertilization 25 Kg/rai (15-15-15) basal
10 kg/rai (46-0-0) topdress

Table 2 Yield performance of 7 hybrids at different fertilizer levels in Khon Kaen.

Variety (b)	(a) Fert. (15-15-15) kg/rai			Average
	0	25	50	
Veraflor	14.5	17.8	21.0	17.8
Rustiflor	28.3	32.3	57.5	39.4
Maryflor	63.5	53.5	45.3	54.1
Cerflor	52.5	65.8	53.3	57.2
Topflor	44.3	57.3	84.8	62.2
S.101	72.7	90.0	72.3	73.8
Hysun 33	91.3	79.7	107.0	92.7
Average	52.5	56.5	63.0	

LSD. 05 (b) 37.4 kg/rai level a –NS, b – **

Table 3 Yield performance of 7 hybrids at different fertilizer level in Srisaket

Variety (b)	(a) Fert. (15-15-15) kg/rai			Average
	0	25	50	
Veraflor	85.9	121.4	60.7	89.3
Rustiflor	–	–	–	–
Maryflor	56.3	139.3	133.3	109.6
Cerflor	124.6	81.8	97.8	101.4
Topflor	106.7	115.6	136.3	119.5
S.101	174.7	242.9	284.5	234.0
Hysun 33	237.0	263.7	284.5	261.7
Average	130.9	160.8	166.2	

LSD. 05 (b)	= 42.17	LSD. 05 (a)	=31.20
C.V. (a)	= 22.09%	C.V. (b)	= 28.71%
Level a	= *	b = ** a × b	=NS*

Table 4 Yield performance of 7 hybrids at different fertilizer

Variety (b)	(a) Fert. (15-15-15) kg/rai			Average
	0	25	50	
Veraflor	46.7	97.5	84.5	76.3
Rustiflor	–	–	–	–
Maryflor	52.1	92.8	101.9	82.3
Cerflor	26.9	74.5	107.3	69.6
Topflor	–	–	–	–
S.101	55.8	104.0	108.1	90.4
Hysun 33	55.8	131.6	103.2	96.9
Average	48.1	100.1	101.1	

C.V. (a) = 55.52% Level a = NS, b = NS, a × b = NS
C.V. (b) = 45.48%

Table 5 Yield performance of 7 hybrids average from all location

Variety*	Khonkaen	Srisaket	Mahasarakam	Average
Hysun 33	17.8	89.3	76.3	150.43
S.101	39.4	–	–	134.57
Topflor	54.1	109.6	82.3	90.95
Maryflor	57.2	101.4	69.6	82.00
Cerflor	62.4	119.5	–	76.07
Veraflor	78.3	234.0	90.4	61.13
Rustiflor	92.7	261.7	96.9	39.40

Table 6 Performance of sunflower hybrids at Sukhothai FCRC

Hybrids	Plant ht. (cm.)	Head	Seed wt./head (gm)	Barren seed (%)	Yield (kg/rai)
Cerflor	119.7	17.6	44.5	5.7	333.1
Maryflor	133.4	17.9	72.1	2.8	420.8
Rustiflor	109.0	19.5	65.0	8.2	266.6
Veraflor	106.1	18.5	66.2	4.6	363.1
Topflor	114.5	18.9	63.5	5.5	392.1
S.101	113.7	21.3	74.2	3.7	412.4
H.33	133.7	18.1	80.9	1.5	314.3

Planting date : 17 Oct. 87 Harvesting date : 7–18 Jan. 88
Fert : 15-15-15 = 12.6 kg/rai (basal)

Table 7 Yield performance of S.F. hybrids at CMU and Chiangmai FCRC in the late rainy season, 1987.

Variet	CMU Fert. 15-15-15 (kg/rai)		X	Chiangmai FCRC
	25	50		
Cerflor	277	440	358.5	104.1
Maryflor	323	329	326.0	101.8
Rustiflor	–	–	–	113.7
Topflor	392	462	427.0	68.7
Veraflor	398	560	476.5	31.1
S.101	–	–	–	200.4
Hysun 33	456	601	528.5	204.9
X	369.2	478.4	423.8	117.8