RESULTS OF THE NETWORK EXPERIMENTATION OF SUNFLOWER CULTIVARS IN THE BIENNIAL CYCLE 1980–1981

Authors : see Annex 1

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INTRODUCTION

Developing gradually its activity, the subnetwork dealing with the experimentation of sunflower cultivars in international trials completed three biennial cycles. In the third biennial cycle (1980—1981), the number of participants amounted to 28 research institutes or stations from 24 countries. Along with all sunflower growing countries of Europe, except Soviet Union, certain countries from Middle East, Asia, Africa, Latin America and U.S.A., participated actively too (Annex 1). The more active co-operation in the frame of this subnetwork reflects the increasing importance of sunflower over the world.

ANNEX 1

List of participants in F.A.O. co-operative trials (1980—1981)

Country and location	Name and address	Trials conducted and year
1	2	3
	EUROPE	
Bulgaria G. Toshevo	Fota Stoyanova Tzvetkova, Institute for Wheat and Sunflower, General Toshevo 9520, Tolbuhin	No. 2 1981
France Aude	M. Rollier, CETIOM, 174 Avenue Victor Hugo, Paris 75116	No. 2 1980
France Montpellier	G. Piquemal, Station d'Amélioration des Plantes (INRA), 9 Place Viala, 34060 Montpellier Cedex	No. 1 1980
F. Rep. Germany Giessen	W. Schuster, Institut für Pflanzenbau und Pflanzenzüchtung, Universität Giessen, 23 Ludwigstrasse, 6300 Giessen	No. 1 1980—1981
Hungary Iregszemcse	E. Kurnik, Takarmánytermesztési Kutató Intézet, Research Institute for Forage Crops, 7095 Iregszemcse	No. 1 No. 2 1980—1981
Hungary Szeged	Frank József, Gabonatermestési Kutató Intézet, Cereal Research Institute, Pf : 391, H-6701, Szeged	No. 2 1980—1981
Italy Pisa	A. Benvenuti, G. P. Vannozzi, Istituto di Agronomia Generale e Coltivazioni Erbacee, Via S. Michele degli Scalzi 2, Pisa 56100.	No. 1 No. 2 1980—1981
Netherland Wageningen	G. Dantuma, Centre for Agro-Biological Research, Bornsesteeg 65, Wageningen	No. 1 1980

1	2	3
Poland Poznań	K. Kloczowski, Plant Breeding and Acclimatization Institute, Sieroca 1 a, 61—771 Poznań	No. 1 — 1980—1981
Portugal Elvas	Maria Y. Vivas, Estaçao Nacional de Melhoramento de Plantas, 7351 Elvas	No. 2 (two locations) 1980
Romania Fundulea	A. V. Vrânceanu, F. M. Stoenescu Research Institute for Cereals and Industrial Crops, 8264 Fundulea, jud. Călăraşi	No. 1 — No. 2 1980—1981 No. 3 — 1980
Romania Podu Iloaie	V. Rusanovski, Elena Andrei, Agricultural Research Station, Podu Iloaie, Iaşi	No. 1 — 1980 No. 2 — 1980—1981
Spain Tomejil	Juan Dominguez-Gimenez, National Research Centre for Oil Crops, INIA, Finca Alameda del Obispo, Apartado 240, Córdoba	No. 2 — 1980
Turkey Edirne	E. Indelen, Agricultural Research Institute, P. O. Box 161, Edirne	No. 2 (two locations) 1980—1981
Turkey Yeşilköy	Türker Cirit, Agricultural Research Institute, P. O. Box 1, Yeşilköy — Istanbul	No. 2 — 1980 No. 3 — 1980—1981
Turkey Ankara, Luleburgaz	Kamil Ilisulu, Faculty of Agriculture, Industrial Plant Department, Ankara	No. 3 (two locations) 1980
Yugoslavia Novi Sad	D. Škorić, Institute of Field and Vegetable Crops, Maksima Gorkog 30, 21000 Novi Sad	No. 1 — 1980 No. 2 — 1980—1981
	NEAR EAST, SOUTH AND SOUTH-EASTERN ASIA	
Iran Karaj	Oil Crops Section, Seed and Plant Improvement Institute, Mardabad Road, Karaj	No. 3 — 1981
Israel Volcani	Baruch Retig, Division of Field Crops, Agricultural Research Organization, Volcani Center, Beit-Dagan 50200	No. 3 — 1980—1981
Pakistan Islamabad	A. Rahman Khan, Pakistan Agricultural Research Council, L-13, Almarkaz f-7/2, P. O. Box 1031, Islamabad	No. 3 — 1980
Philippines Muñoz	Filomena F. Campos, Director, Research & Development, Central Luzon State University, Muñoz, Nueva Ecija	No. 3 — 1980—1981
	AFRICA	
Algeria Issers	Souissi Mostefa, Directeur Géneral, Institut de Dévelopement des Cultures Industrielles, Jardin d'Essais du Hamma, B. P. 28, El-anasser	No. 3 — 1980
Egypt Elnaubaria, Sakha	M. Serry, Under Secretary of State, Ministry of Agriculture, Dokkie, Giza	No. 3 (two locations) 1980—1981
Tunisia Ariana	A. D. Soudir, Institut National de Recherches Agronomiques INRAT, Route de Sokra, Ariana, Tunis	No. 3 — 1980
Tanzania Mtwara	Stephen R. Preston, Agricultural Research Institute, Naliendele, P. O. Box 509, Mtwara	No. 3 — 1981
	NORTH AND SOUTH AMERICA	
U.S.A. Casselton	W. W. Roath, Oilseeds Investigations, 212 Waldron Hall, North Dakota State University, University Station, Fargo, North Dakota 58102	No. 1 — 1980 No. 2 — 1980—1981

1	2	3
Canada Morden	M. Dedio, Research Station, P. O. Box 3001, Morden — Manitoba	No. 1 — 1980
Argentina Miramar	Ana Lilia Gonzales de Schelotto, Chacra Experimental de Miramar, Casilla Correo 35, Miramar 7607 (Buenos Aires)	No. 4 — 1980—1981 1981—1982
Chile Platina-Santiago	Vital Valdivia, Research Station La Platina, Santa Rosa 11610, Paradero 33, Casilla 5427, Santiago	No. 4 — 1980—1981

MATERIALS AND METHODS

Four groups of cultivars with different lengths of vegetation period were established (Annex 2), corresponding to different geographical zones as follows :

— Trial No. 1 : 14 early and medium-early hybrids and one open-pollinated variety, for West and Central Europe, Canada and North of the U.S.A. ;

ANNEX 2 (a)

TRIAL No. 1

with early and medium-early cultivars : single (SH) and three-way (TH) hybrids, open-pollinated varieties (OPV)

Entry No.	Cultivars	Genetic type	Supplying country
1	Ala	OPV	Italy
2	Primasol	SH	France
3	Hybrid 27/77/Gi	SH	F. R. Germany
4	Marika	SH	F. R. Germany
5	Vera	SH	F. R. Germany
6	NS-H-10	SH	Yugoslavia
7	NS-H-11	SH	Yugoslavia
8	NS-H-13	SH	Yugoslavia
9	NS-H-17	SH	Yugoslavia
10	RO-18	SH	Romania
11	RO-19	SH	Romania
12	RO-22	SH	Romania
13	RO-26	SH	Romania
14	RO-27	TH	Romania
15	RO-34	SH	Romania

— Trial No. 2 : 19 medium-late hybrids and one variety for South-East Europe ;

— Trial No. 3 : 10 hybrids and 10 varieties of medium — late or lute maturity for Near and Middle-East and Africa ;

— Trial No. 4 : 12 hybrids and 8 varieties of medium-late and late maturity for Central and South America.

Some Network's members carried out in addition trials established for other zones, for example : Trial No. 1 (Pisa — Italy, Iregszemcse — Hungary, Fundulea and Podu Iloaie — Romania, Novi Sad — Yugoslavia) ;

ANNEX 2 (b)

TRIAL No. 2

with medium-late and medium-early cultivars : single (SH) and three-way (TH) hybrids, open-pollinated varieties (OPV)

Entry No.	Cultivars	Genetic type	Supplying country
1	Peredovik	OPV	Bulgaria
2	Contiflor	SH	Argentina
3	Gahib-6	SH	Hungary
4	Gahib-7	SH	Hungary
5	Halcon	SH	Spain
6	Pinzon	SH	Spain
7	SH-S-690	SH	Spain
8	SH-3000×2	TH	Spain
9	SH-72 M×1 161	TH	Spain
10	Sunbred 265	SH	U.S.A.
11	Interstate 7775	SH	U.S.A.
12	D.O. 704	SH	U.S.A.
13	NS-H-33	SH	Yugoslavia
14	NS-H-36	SH	Yugoslavia
15	RO-29	TH	Romania
16	RO-40	SH	Romania
17	RO-45	SH	Romania
18	RO-46	SH	Romania
19	RO-100	SH	Romania
20	RO-130	SH	Romania

Trial No. 2 (Aude — France and Casselton — U.S.A.) ; Trial No. 3 (Fundulea — Romania).

The tested cultivars have represented the most recent achievements of breeders from : Argentina, Bulgaria, France, West Germany, Hungary, Italy, Romania, Spain, U.S.A. and Yugoslavia. With the exception of Trial No. 1, which contained 15 entries, all the other three trials were made up of 20 entries. All trials were supplemented by 2—3 reserve entries. In the second year of this cycle some cultivars were replaced by the reserves because the F.A.O. Seed Laboratory did not receive in time the seed samples (Impira INTA, Guayacan INTA and Contiflor) or the samples of the hybrids Halcon and SH-3000×2 were received with broken bags.

The experimental design was the latin rectangle with 5 and in some cases 4 replica-

ANNEX 2 (c)

TRIAL No. 3

with late single (SH) and three-way (TH) hybrids, open-pollinated varieties (OPV)

Entry No.	Cultivars	Genetic type	Supplying country
1	Peredovik	OPV	Bulgaria
2	Impira Inta	OPV	Argentina
3	Guayacan Inta	OPV	Argentina
4	GK-70	OPV	Hungary
5	Siponto	OPV	Italy
6	Egnazia	OPV	Italy
7	Tuscania	OPV	Italy
8	Cosmarema	OPV	Italy
9	Pemir	OPV	Spain
10	NS-317	OPV	Yugoslavia
11	Contiflor	SH	Argentina
12	Halcon	SH	Spain
13	SH-3000×2	TH	Spain
14	Sunbred 265	SH	U.S.A.
15	Interstate 7775	SH	U.S.A.
16	NS-H-33	SH	Yugoslavia
17	NS-H-36	SH	Yugoslavia
18	RO-40	SH	Romania
19	RO-100	SH	Romania
20	Sorem 82	SH	Romania

ANNEX 2 (d)

TRIAL No. 4

with medium-late single hybrids (SH) and open-pollinated varieties (OPV)

Entry No.	Cultivars	Genetic type	Supplying country
1	Peredovik	OPV	Bulgaria
2	Impira Inta	OPV	Argentina
3	GK-70	OPV	Hungary
4	Siponto	OPV	Italy
5	Tuscania	OPV	Italy
6	Cosmarema	OPV	Italy
7	Pemir	OPV	Spain
8	NS-317	OPV	Yugoslavia
9	Contiflor	SH	Argentina
10	Dekalb G-97	SH	Argentina
11	Halcon	SH	Spain
12	Pinzon	SH	Spain
13	Sunbred 265	SH	U.S.A.
14	Hybrid 894	SH	U.S.A.
15	NS-H-33	SH	Yugoslavia
16	NS-H-36	SH	Yugoslavia
17	RO-40	SH	Romania
18	RO-45	SH	Romania
19	RO-100	SH	Romania
20	Sorem 82	SH	Romania

tions. Most of the participants adopted the same experimental technique in order to facilitate the statistical interpretation and reduce the errors. Detailed instructions for the experiments were prepared by the Crop and Grassland Production Service of F.A.O. in co-operation with the Liaison Centre of Fundulea and sent to all participants. Along with them, a field book for each trial was received, providing the co-operators with guidelines for uniform and therefore comparable gathering of data, which could be statistically evaluated using the specific computer programmes available at F.A.O. Headquarters. The analyses of variance for Trials No. 1 and No. 2 were performed on the bases of these programmes.

Some institutions did not succeed in supplying scientific, rigorous or complete data due to either the less favourable climatic conditions, or to certain accidental causes. No results were received from 8 places.

As in the previous experiments, the results obtained in this biennial cycle indicated a large diversity of the responses of the genotypes to the environmental variation, but some genotypes exhibited constant good behaviour in most locations.

RESULTS AND DISCUSSION

Trial No. 1

As expected, the highest yields were obtained in South-East and South Europe (Romania, Yugoslavia, Hungary and Italy), were some hybrids surpassed even the level of 40 q/ha (Table 1). Good results were also noted in the Netherlands and Canada. On the average, the firts three high yielding cultivars were Ro-22, H-27/77 and NS-H-13.

Although the oil content in dry matter varied greatly from location to location and from year to year, a part of the genotypes, as Ro-34, Ro-27, Ro-19, NS-H-10, with the highest mean values, were the first from this point of view in most cases (Table 2). The range of cultivars according to this important trait remained almost the same in all environments, not only in this trial but also in the other three ones. These results confirm again that the oil content is characterized by a great genetic variation.

The main morpho-physiological characteristics (Table 3) manifested also a large variation. The earliest hybrids were : Ro-18, Ro-26 and Vera. Generally, plant height appeared positively correlated with the period of vegetation in al trials and volumetric weight and seed size in an evident negative correlation for most genotypes.

In respect of resistance to diseases (Table 4) the information available put in evidence a clear cut resistance to downy mildew *(Plasmopara helianthi)* of most hybrids. The reaction of cultivars to the attack of gray rot

Table 1

TRIAL No. 1/1980—1981. Seed yield test (q/ha, 0 % moisture)

Cultivars	Romania			Hungary		Yug.	Poland		Germany F. R.		Netherland	Italy		France	U.S.A.	Canada	Mean	
	Fundulea		Podu Iloaie	Iregszemcse		Novisad	Poznan		Giessen		Wageningen	Pisa		Montpellier	Casselton	Morden	q/ha	Grouping*
	1980	1981	1980	1980	1981	1981	1980	1981	1980	1981	1980	1980	1981	1981	1980	1981		
RO-22	43.7	33.6	29.1	32.7	19.7	33.9	14.0	14.9	22.6	23.7	29.8	44.3	24.1	22.8	20.9	27.9	27.4	A
H-27/77	38.3	31.2	25.3	29.8	23.7	35.0	12.7	12.6	21.5	24.5	31.3	30.0	19.2	22.8	19.7	28.2	25.4	B
NS-H-13	39.1	32.2	25.8	25.6	26.6	38.6	10.0	18.6	18.8	24.2	21.6	24.6	25.2	22.7	18.6	34.4	25.4	B
Marika	35.4	30.3	24.5	24.9	24.2	26.8	10.3	10.6	18.8	23.4	31.1	34.2	22.1	21.2	17.4	28.8	24.6	BCD
Vera	36.5	29.1	21.5	25.9	24.9	32.1	11.7	11.4	19.0	26.3	30.2	36.6	20.6	22.7	18.3	26.5	24.6	BCD
NS-H-17	37.3	29.6	29.6	26.8	23.5	35.8	12.8	17.2	12.6	20.1	26.2	30.7	24.5	20.0	19.1	27.2	24.5	BCD
NS-H-11	35.9	31.3	25.1	27.7	24.3	31.1	11.6	15.9	14.0	25.4	24.6	22.9	15.2	23.3	17.7	33.3	23.7	CDE
Primasol	36.7	30.1	24.3	31.6	23.9	39.0	11.1	11.2	13.9	19.5	24.1	25.7	15.3	22.4	22.7	24.3	23.5	CDE
RO-19	39.4	33.2	20.4	23.5	23.3	21.8	10.2	8.8	15.7	16.8	28.6	45.5	22.0	21.0	21.1	21.1	23.3	DE
RO-27	35.5	31.9	23.1	21.3	22.2	25.2	11.9	10.0	16.9	23.6	24.8	30.6	18.1	21.2	18.9	21.7	22.3	EF
Ala	34.5	29.0	21.5	23.4	20.2	24.6	7.4	8.5	15.3	17.6	25.6	36.5	15.3	20.0	19.0	25.1	21.5	FG
NS-H-10	32.9	29.5	22.2	25.1	19.8	25.9	6.5	14.1	13.5	15.4	23.3	24.8	22.7	20.2	16.7	26.1	21.2	FG
RO-34	33.7	32.9	20.4	24.2	19.3	33.3	6.2	9.8	9.8	22.3	21.5	13.5	11.8	19.7	15.1	23.2	19.8	FGH
RO-26	35.8	30.1	20.5	21.1	20.6	25.7	6.3	8.5	13.8	17.7	19.6	19.6	19.6	17.1	17.9	21.5	19.7	FGH
RO-18	35.1	30.3	14.4	16.4	21.9	22.0	6.9	6.1	12.4	15.8	16.1	16.3	22.9	20.2	20.0	18.4	18.5	H
Mean	36.7	30.9	23.2	25.3	22.5	30.7	10.0	11.9	15.9	21.1	25.2	29.4	19.9	21.1	18.9	25.8	23.0	

* Means with the same letter are not significantly different (Duncan's multiple range test).

Table 2

TRIAL No. 1/1980—1981. Oil content in dry matter (%)

Cultivars	Romania			Hungary		Yug.	Poland		Germany F. R.		Italy		France	U.S.A.	Canada	Mean	
	Fundulea		Podu Iloaie	Iregszemcse		Novisad	Poznan		Giessen		Pisa		Montpellier	Casselton	Morden	%	Grouping*
	1980	1981	1980	1980	1981	1981	1980	1981	1980	1981	1980	1981	1981	1980	1981		
RO-34	56.4	54.8	52.0	52.0	50.0	49.0	48.6	48.2	51.0	52.5	52.5	46.5	58.8	52.0	45.1	51.3	A
RO-27	55.8	52.8	51.0	51.0	52.0	46.5	47.2	47.8	50.0	50.5	53.3	43.3	57.8	51.0	43.8	50.2	B
RO-19	54.0	51.8	50.0	50.0	53.0	43.3	47.0	48.2	49.0	46.8	50.5	46.8	56.5	47.0	41.8	49.1	C
NS-H-10	55.2	48.5	51.0	52.0	48.0	42.5	45.2	43.6	50.0	46.3	54.0	45.3	58.0	50.0	42.8	48.8	C
RO-18	51.4	53.8	48.0	45.0	52.0	43.0	42.2	45.0	48.0	48.0	47.5	48.0	55.5	48.0	41.5	47.8	D
RO-26	52.0	52.5	48.0	55.0	53.0	43.8	40.8	45.0	47.0	45.8	46.5	44.5	54.0	46.0	40.5	47.6	D
Ala	52.6	50.3	49.0	47.0	52.0	42.5	44.2	45.8	48.0	42.0	48.0	45.3	55.0	47.0	44.5	47.5	D
RO-22	51.2	49.0	48.0	48.0	48.0	43.8	43.2	44.6	46.0	46.0	46.8	43.8	49.8	43.0	40.3	46.1	E
Primasol	51.0	50.3	47.0	45.0	48.0	46.0	42.2	43.4	45.0	39.3	47.0	45.3	52.0	45.0	44.5	46.1	E
NS-H-13	52.0	44.0	49.0	49.0	43.0	42.8	46.4	39.2	45.0	48.0	50.3	43.3	53.0	46.0	39.8	46.1	E
NS-H-11	50.0	46.3	47.0	47.0	46.0	39.0	46.2	44.0	45.0	47.3	45.8	43.0	52.8	44.0	41.0	45.6	E
H-27/77	49.2	48.8	44.0	47.0	45.0	41.8	42.4	41.8	44.0	39.3	46.3	43.3	50.8	42.0	40.5	44.4	F
NS-H-17	48.6	41.3	46.0	46.0	43.0	37.8	43.8	42.8	44.0	44.0	46.3	42.0	51.3	45.0	37.0	43.9	F
Marika	49.2	47.3	44.0	45.0	46.0	42.8	40.8	40.6	44.0	41.5	41.8	42.0	50.0	43.0	40.0	43.9	F
Vera	43.4	42.0	40.0	38.0	39.0	34.8	37.4	38.0	38.0	38.3	38.0	38.0	44.5	37.0	34.8	38.8	G
Mean	51.5	48.9	47.6	47.8	47.9	42.6	43.8	43.9	46.3	45.0	47.6	44.0	53.3	45.7	41.2	46.5	

* Means with the same letter are not significantly different (Duncan's multiple range test).

Table 3

TRIAL No. 1/1980—1981. Morpho-physiological characteristics

Cultivars	No. of days from emerg. to : flowering limits	flowering mean	maturity limits	maturity mean	Head diam. (cm) limits	Head diam. (cm) mean	Plant height (cm) limits	Plant height (cm) mean	Volumetric weight (kg/hl) limits	Volumetric weight (kg/hl) mean	1,000 seed weight (g) limits	1,000 seed weight (g) mean	Husks (%) limits	Husks (%) mean
Ala	79—94	85	124—135	129	16—20	18	134—206	170	35—39	36	45—82	66	23—27	25
Primasol	72—92	84	126—135	130	19—22	20	122—200	158	36—43	38	41—67	55	27—28	28
H-27/77	70—94	85	126—139	132	17—22	19	115—190	160	34—39	37	44—63	56	26—28	27
Marika	69—91	84	120—137	130	17—21	19	118—182	159	34—42	37	48—73	58	26—33	31
Vera	67—88	82	119—133	126	17—21	19	115—183	160	38—41	40	49—65	61	26—35	31
NS-H-10	72—96	87	122—139	130	14—20	18	118—150	148	39—44	41	40—60	45	20—28	24
NS-H-11	69—89	83	121—135	127	19—22	20	125—180	163	36—49	42	41—61	48	20—29	25
NS-H-13	72—94	86	127—135	133	14—21	19	120—186	160	40—48	43	40—58	51	23—31	27
NS-H-17	69—93	84	123—135	127	17—21	19	119—160	145	39—46	42	33—55	52	25—30	28
RO-18	65—90	80	119—129	123	15—20	18	115—163	141	27—46	36	43—70	60	27—29	28
RO-19	72—96	85	123—135	128	16—24	22	116—157	143	34—39	37	44—77	63	21—24	23
RO-22	67—95	84	128—135	130	16—23	21	124—164	148	38—44	41	40—60	53	23—28	26
RO-26	65—88	77	125—129	126	17—22	20	116—153	138	30—40	36	58—82	67	23—26	25
RO-27	70—90	80	123—135	128	17—21	20	121—156	142	32—39	36	54—81	69	19—24	22
RO-34	69—91	80	126—135	128	15—20	18	110—170	143	34—43	39	42—88	66	21—24	23

(Botrytis cinerea) varied much from location to location. One explanation could be the following : this fungus invades firstly the senescent tissues and spreads afterwards over the green ones. If notes were taken at the same date for all entries, the earlier ones, which possess larger surfaces of dead tissues, could show a more intense attack. As an example, the earliest hybrids Ro-18 and Ro-26 presented a greater susceptibility than all the others. Such a situation appears also analysing the respective data recorded at the other trials. Therefore, observations on the reaction to the attack of *Botrytis cinerea* should be performed at the end of physilogical maturity of each cultivar.

Table 4

TRIAL No. 1/1980—1981. Resistance to diseases and unfavourable conditions (natural infection)

Cultivars	*Plasmopara helianthi* (% diseased) pl. Fundulea 1980	Fundulea 1981	Ireg. 1980	Ireg. 1981	*B. cinerea* (% diseased) pl. Podu-Iloaie 1980	Ireg. 1980	Poznan 1980	*Puccinia helianthi* (type) Casell-ton 1980	*S. sclerotiorum* (% diseased) pl. Fundulea 1980	Fundulea 1981	Podu-Iloaie 1980	Lodging Ireg. 1981	Fundulea 1980 %	Fundulea 1980 note	Bird damage (%) Pisa 1980	Bird damage (%) Pisa 1981
Ala	33	9	2	0	18	33	93	1	12	10	41	56	70	3	50	10
Primasol	9	4	0	0	0	83	68	0	6	5	51	55	15	2	66	16
H-27/77	3	5	0	0	4	40	16	1	5	2	21	81	20	2	48	29
Marika	15	4	2	0	1	17	64	1	6	2	42	44	40	3	45	27
Vera	28	6	7	0	21	23	76	1	5	5	34	63	35	3	49	23
NS-H-10	4	1	0	0	11	43	61	0	9	8	36	57	0	0	77	10
NS-H-11	0	1	1	0	0	67	65	0	6	4	48	69	10	1	83	21
NS-H-13	0	0	0	0	1	23	61	0	2	7	23	56	5	1	46	2
NS-H-17	0	1	2	0	4	23	59	0	4	8	23	51	15	1	51	14
RO-18	0	0	2	0	9	90	100	2	5	2	73	86	10	1	73	13
RO-19	0	2	0	0	7	50	85	2	0	5	48	82	0	0	43	7
RO-22	0	0	0	0	0	70	49	2	0	0	17	79	0	0	25	10
RO-26	0	0	0	0	10	90	94	1	6	8	72	81	15	1	71	6
RO-27	0	0	0	0	14	43	93	1	3	5	55	68	20	1	53	30
RO-34	0	4	0	0	22	56	96	1	4	1	45	62	15	1	83	20

A better field resistance to white rot *(Sclerotinia sclerotiorum)* was recorded to the hybrids Ro-22, NS-H-13 and NS-H-17. The hybrids NS-H-10, Ro-19 and Ro-22 manifested the best resistance to lodging and Ro-22, NS-H-13 and Ro-19 better resistance to bird damage.

Trial No. 2

The results of this trial are presented in Tables 5—8. As in the case of Trial No. 1, a great variation from location to location and from year to year is also evident. Seed yields ranged from 5.5 to 46.4 q/ha, the highest being obtained in South-Eastern Europe and the lowest in Turkey, Spain and France (Table 5). The hybrids Ro-29, Ro-40 and Ro-130 achieved the highest mean yields. The hybrid Gahib 6 had also good results, but was experimented only in 1981. Contiflor, studied only in 1980, expressed a high yielding capacity, but proved to be much too late for most European countries and for the North of the U.S.A.

Data from Table 6 point out a good or very good level of oil content in dry seeds for most cultivars. Over 50% mean values presented the hybrids Ro-45 and Ro-100. Contiflor, which is a cultivar of Argentinian type, exhibited a very low oil content in all locations.

Most hybrids are earlier and shorter than the open-pollinated variety Peredovik (Table 7). The best test weight values displayed the hybrides : NS-H-36, Ro-40, NS-H-33, Ro-29 and Ro-45. The cultivars : Peredovik, Contiflor, IH-10 and Ro-130 produced larger seeds and IH-10 and Ro-130 were characterized by very low husk percentage.

In contrast with the variety Peredovik, most hybrids manifested a better resistance to diseases (Table 8). The genes Pl_1 and Pl_2 for resistance to *Plasmopara helianthi,* are present in almost all actual cultivated or experimental hybrids. The hybrids Ro-40, Ro-100 and Ro-45 exhibited the best resistance to *Botrytis cinerea* at Iregszemcse (1980) and Podu Iloaie (1981) and SH-S-690 and SH-3 000 × 2 the best reaction to *Puccinia helianthi* at Casselton. In comparison with Peredovik, almost all hybrids revealed a better response to *Sclerotinia sclerotiorum* and lodging. Less damaged by birds were the hybrids Ro-29 and Interstate 7775.

Trial No. 3

This trial with medium-late and late sunflower varieties and hybrids presents a special importance, because it was conducted in countries from Near and Middle East, Africa and Asia which have started very recently to introduce and develop sunflower crop. The local conditions, differing extremely from one location to the other and from year to year, in some cases being almost completely unfavourable to this species, determined a very large variation in behaviour of the investigated cultivars. Besides valuable information on the performances of the respective crop, the results contribute also to the establishment of the optimal biological parameters of the adaptability for each environment. Unfortunately, an analysis of variance couldn't be performed because of too many missing entries in different locations.

The highest seed yielding cultivars were those of Argentinian type : Contiflor, Impira INTA and Guayacan INTA (Table 9), but in the same time, they presented the lowest oil content in the seeds (Table 10), and were very late and tall (Table 11). Good yield levels were recorded in both years in Israel and Philippines (Tabel 9). In 1980, besides Fundulea (Romania), acceptable or good yields were obtained at Ankara and Luleburgaz (Turkey), Sakha and Elnaubaria (Egypt), Issers (Algeria) and Ariana (Tunisia).

The best oil content in dry seeds (over 47%) was provided by the cultivars Ro-45, Peredovik and SH-3 000×2 (Table 10).

The cultivars which are common to Trial No. 2 appeared to be much earlier in these zones, than in Europe and in U.S.A., at least with 10 days (Table 11). The results of this trial point out, perhaps more evident than the other trials, that the number of days from emergence to flowering and especially to maturity are positively correlated with plant height. Increased mean values of volumetric weight (42—43 kg/hl) presented the hybrids : NS-H-36, Ro-40 and SH-3 000×2, and of weight of 1 000 seeds the varieties Peredovik and Cosmarema. A low husk percentage characterized tihe varieties NS-317, Peredovik, Cosmarema and Pemir, and the hybrids Ro-100 and Ro-45.

In comparison with the open-pollinated varieties, the hybrids manifested also a better resistance to the most important diseases and plant lodging (Table 12).

Trial No. 4

This trial, comprising medium-late and late sunflower open-pollinated varieties and hybrids, designated for Central and South America, was adequately carried out only at Miramar (Argentina), both years, and Platina-Santiago (Chile), one year.

Very good seed yields were obtained at Miramar in 1981—1982 and good at Platina-Santiago (Table 13). Oil content in dry matter of the most entries ranged from 45 to 50% (a medium level).

As in the other trials, Argentinian cultivars (Impira INTA and Contiflor) were later and taller than all the others (Table 14). Good volumetric weight values were noted at the hybrids NS-H-36, NS-H-33 and RO-40. The largest seeds presented the varieties Siponto, Pemir, Tuscania and Cosmarema.

Table 5

TRIAL No. 2/1980—1981. Seed yield test (q/ha, 0 % moisture)

Cultivars	Romania				Hungary				Yugoslavia		Bulg.	Turkey			Italy		France	Spain	Portugal		U.S.A.		Mean	
	Fundulea		Podu Iloaie		Szeged		Iregs-zemcse		Novi Sad		Tos-hevo	Edirne		Yeşil-köy	Pisa		Aude	Tome-jil	Elvas irrig.	Elvas dry land	Casselton		q/ha	Grou-ping *
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1981	1980	1981	1981	1980	1981	1980	1980	1980	1980	1980	1981		
RO-29	39.3	30.8	31.9	29.1	33.6	26.4	28.2	27.9	29.7	29.9	40.8	16.8	20.2	7.7	21.7	27.8	19.5	14.5	33.5	24.3	13.3	21.3	25.6	A
RO-40	35.7	32.4	32.0	39.2	31.3	27.9	29.0	25.1	23.0	23.6	39.2	21.2	17.5	7.2	17.5	25.6	19.2	11.1	18.7	24.0	23.2	19.8	24.4	AB
RO-130	41.3	31.0	30.5	27.4	29.7	30.7	26.6	28.0	28.3	32.4	37.5	13.9	17.9	9.0	10.4	32.6	18.1	13.1	29.2	16.3	20.0	20.3	24.4	AB
Sunbred 265	34.3	28.5	30.8	34.7	29.3	29.5	25.3	25.7	37.8	30.0	29.2	14.6	17.3	8.4	14.8	29.5	18.8	12.2	25.4	21.5	18.5	20.5	24.1	ABC
NS-H-36	37.4	29.0	31.5	35.3	31.3	26.1	27.4	29.1	25.6	32.6	31.2	18.4	16.0	7.1	16.6	25.0	16.2	12.2	31.1	13.0	21.2	20.5	23.9	ABC
Interst. 7775	38.1	30.6	27.2	29.6	32.5	22.5	28.3	25.5	34.8	28.8	31.2	17.4	15.4	5.5	14.7	31.7	15.9	14.5	26.0	21.4	20.8	19.3	23.8	ABC
DO-704	37.0	29.6	27.7	32.2	30.1	25.5	26.3	27.5	34.2	28.3	31.6	13.3	16.8	6.8	15.4	26.8	14.9	14.4	30.1	19.3	20.6	19.3	23.7	ABC
Peredovik	37.2	27.9	25.1	38.0	32.5	26.9	19.6	26.1	23.4	20.8	34.9	21.2	18.0	6.4	20.2	23.6	17.1	11.8	28.4	21.0	17.5	17.8	23.2	BCD
NS-H-33	37.9	27.6	26.0	33.4	37.2	27.3	27.3	26.8	40.9	21.0	29.1	14.9	16.5	7.2	12.1	25.7	16.2	7.3	17.7	20.5	21.2	19.3	23.0	BCD
RO-100	36.3	29.4	29.6	33.4	35.6	27.3	30.9	24.5	22.8	26.6	29.2	16.4	13.8	7.7	11.9	31.2	16.4	9.6	21.0	17.5	19.8	20.2	22.8	BCD
SH-S-690	37.6	26.6	20.0	26.3	28.6	23.9	31.4	27.1	28.7	25.4	35.7	13.3	16.2	7.5	13.6	33.2	15.0	10.3	31.5	20.2	17.3	14.8	22.6	BCD
SH-72M×1161	35.6	27.7	23.8	29.5	26.6	21.4	23.5	28.5	31.6	24.8	31.6	12.7	13.9	9.8	12.1	33.2	15.9	12.4	28.2	20.7	18.7	14.3	22.2	CDE
Pinzon	33.4	27.0	27.7	29.9	30.5	25.0	25.4	25.7	27.5	25.5	32.3	12.8	14.8	8.1	9.9	27.8	12.1	10.1	23.4	15.4	17.5	18.8	21.5	DEF
SH-3000×2	36.7	29.1	23.2	34.6	29.7	23.6	23.3	24.5	26.3	27.1	30.2	14.9	14.6	7.7	8.5	25.9	15.7	9.4	23.0	12.9	17.7	17.5	21.3	DEF
RO-46	37.3	29.0	17.9	32.1	25.8	21.3	20.2	23.6	19.9	24.5	33.2	15.1	17.4	7.7	7.6	22.9	16.1	10.9	17.5	10.2	20.2	19.3	20.3	EF
RO-45	34.4	30.6	27.9	32.6	32.8	23.9	24.0	17.2	15.2	15.4	26.9	17.9	15.0	6.5	8.8	21.4	18.5	9.2	9.3	8.7	18.9	19.8	19.6	F
Contiflor	41.0	—	25.8	—	41.1	—	30.7	—	22.8	—	—	22.2	—	—	46.4	—	20.4	8.8	32.0	23.5	6.8	—	26.3	
Gahib-6	—	29.7	—	37.1	—	33.3	—	27.7	—	27.6	39.6	—	19.0	5.9	—	33.6	—	—	—	—	—	22.8	26.9	
Gahib-7	—	28.7	—	34.8	—	28.9	—	26.4	—	21.6	30.6	—	17.5	5.9	—	27.9	—	—	—	—	—	19.3	23.5	
Halcon	34.3	—	24.0	—	32.1	—	26.8	—	24.2	—	—	16.2	—	—	7.6	—	14.8	10.7	21.8	17.3	18.0	—	20.7	
Iregi 816 B	27.8	—	18.4	—	—	—	14.7	—	14.0	—	—	11.0	—	—	—	—	12.0	8.8	20.3	9.6	17.2	—	15.4	
IH-10	32.5	—	21.5	—	—	—	20.1	—	22.9	—	—	11.1		—	—	—	15.1	11.0	20.6	13.8	16.3	—	18.5	
Mean	36.2	29.2	26.1	32.7	31.7	26.2	25.4	25.9	26.7	25.9	33.0	15.8	16.5	7.3	15.0	28.0	16.4	11.1	24.4	17.6	18.2	19.2	22.8	

* Means with the same letter are not significantly different (Duncan's multiple range test).

Table 6

TRIAL No. 2/1980—1981. Oil content in dry matter (%)

Cultivars	Romania				Hungary				Yugoslavia		Bulg.	Turkey		Italy		France	Spain	Portugal		U.S.A.		Mean	
	Fundulea		Podu Iloaie		Szeged		Iregs-zemcse		Novi Sad		Tos-hevo	Edirne		Pisa		Aude	Tome-jil	Elvas irrig.	Elvas dry land	Casselton		%	Grou-ping *
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981	1981	1980	1981	1980	1981	1980	1980	1980	1980	1980	1981		
RO-45	54.0	54.8	55.0	57.3	56.8	50.3	50.3	53.7	48.0	50.5	46.5	49.0	50.0	50.4	47.8	56.8	45.8	54.3	46.5	51.0	45.0	51.1	A
RO-100	54.0	53.3	54.0	53.6	55.0	49.5	49.8	51.3	46.8	50.5	49.5	52.0	51.0	51.8	45.5	53.5	47.4	53.3	46.8	48.0	48.0	50.7	AB
RO-130	54.0	55.3	52.0	55.4	55.0	50.3	49.3	49.7	48.8	43.0	49.3	47.0	51.0	53.0	46.0	48.3	45.4	52.3	43.5	49.0	47.0	49.8	ABC
SH-3000×2	53.0	53.0	51.0	53.9	55.4	46.5	49.5	49.7	45.5	50.5	47.0	45.0	54.0	50.3	43.8	50.5	47.0	55.3	45.8	42.0	46.0	49.4	ABC
0—29	52.0	52.8	53.0	53.0	53.0	46.8	48.5	48.3	45.8	49.5	47.5	45.5	51.0	50.3	44.5	51.8	48.2	52.5	46.0	48.0	47.0	49.3	BC
RO-46	51.0	53.8	52.0	53.9	52.0	45.3	46.5	48.0	44.5	43.5	45.8	49.0	53.0	51.0	44.5	51.0	47.8	52.5	45.8	50.0	47.0	49.1	BCD
RO-40	51.0	50.8	52.0	52.8	51.8	49.0	49.0	49.0	44.3	47.8	47.3	50.0	48.0	51.3	46.3	52.5	46.2	52.5	46.8	46.0	45.0	49.0	BCD
Peredovik	53.0	52.0	50.0	52.8	52.8	48.0	46.0	49.0	47.0	44.8	48.8	48.0	50.0	51.3	44.5	49.8	46.6	52.0	47.3	48.0	45.0	48.9	CDE
Sunbred 265	52.0	51.5	49.0	52.7	52.8	45.5	49.5	49.3	46.3	49.8	44.0	46.0	49.0	51.8	42.8	50.3	43.8	52.8	45.5	46.0	45.0	48.4	CDEF
SH-72M×1161	51.0	51.3	49.0	51.9	51.8	45.8	49.3	46.7	44.3	48.0	44.8	42.0	48.0	48.3	43.3	47.5	45.4	50.8	46.5	46.0	44.0	47.4	DEFG
DO-704	51.0	50.5	48.0	51.7	51.5	45.0	48.3	46.7	45.3	47.5	45.5	42.0	48.0	46.8	42.3	46.3	44.6	51.0	44.8	46.0	47.0	47.2	EFG
NS-H-33	50.0	48.5	48.0	51.0	51.3	42.8	47.5	45.3	44.3	47.0	45.0	46.0	48.0	49.8	43.3	50.8	44.6	50.8	46.3	47.0	44.0	47.2	EFG
Interstate 7775	49.0	49.3	47.0	51.1	50.3	44.0	47.5	45.3	45.0	47.8	46.0	44.0	45.0	47.3	41.0	48.3	47.0	49.8	46.0	44.0	43.0	46.5	G
Pinzon	50.0	51.3	47.0	52.2	49.5	48.0	46.5	47.0	43.0	46.3	46.0	34.0	45.0	45.8	43.5	42.8	42.0	49.8	44.7	45.0	48.0	46.0	G
NS-H-36	48.0	48.5	47.0	48.7	49.5	41.5	44.3	42.0	40.5	46.0	41.0	38.0	44.0	44.5	44.8	43.8	43.6	47.8	42.3	45.0	42 0	44.2	H
SH-S-690	47.0	47.5	42.0	48.6	46.8	40.8	43.5	43.0	41.0	44.8	42.5	44.0	45.0	41.8	40.3	44.3	42.8	48.8	41.0	42.0	40.0	43.9	H
IH-10	54.0	—	52.0	—	—	—	50.0	—	49.3	—	—	37.0	—	—	—	55.0	48.4	52.0	47.8	46.0	—	48.7	
Iregi 816 B	56.0	—	52.0	—	—	—	48.5	—	46.3	—	—	47.0	—	—	—	47.0	44.2	52.8	43.8	49.0	—	48.7	
Gahib-6	—	50.8	—	51.0	—	45.5	—	47.0	—	46.3	44.8	—	47.0	—	43.8	—	—	—	—	—	45.0	46.9	
Gahib-7	—	51.5	—	51.6	—	46.0	—	46.3	—	42.8	44.3	—	47.0	—	41.8	—	—	—	—	—	46.0	46.4	
Halcon	50.0	—	49.0	—	51.0	—	46.8	—	43.3	—	—	39.0	—	46.0	—	46.8	43.8	49.8	45.0	44.0	—	46.2	
Contiflor	44.0	—	44.0	—	43.8	—	37.3	—	36.0	—	—	36.0	—	40.8	—	45.8	40 4	44.5	43.0	38.0	—	41.1	
Mean	51.2	51.5	49.7	52.4	51.7	46.1	47.4	47.6	44.8	47.0	45.9	44.0	48.5	48.5	43.7	48.9	45.2	51.3	45.4	46.0	45.2	47.6	

* Means with the same letter are not significantly different (Duncan's multiple range test).

Table 7

TRIAL No. 2/1980—1981. Morpho-physiological characteristics

Cultivars	No. of days from emerg. to :				Head. diam. (cm)		Plant height (cm)		Volume weight (kg/hl)		1 000 k weight (g)		Husk (%)	
	flowering		maturity											
	limits	mean	limits	mean	limits	mean	limits	mean	limits	mean	limits	mean	limits	mean
Peredovik	61—81	70	82—148	114	10—23	18	135—190	168	34—42	37	44—75	68	19—27	24
Contiflor	82—93	86	92—168	134	10—28	20	125—260	192	32—46	39	37—83	66	35—41	37
Iregi 816 B	56—76	65	75—132	104	11—18	15	110—154	130	34—42	38	46—68	55	18—27	23
IH-10	58—75	63	75—137	106	10—18	16	113—155	136	35—38	36	43—88	64	18—25	22
Halcon	59—78	66	78—134	106	10—27	18	120—166	130	37—45	39	35—57	49	20—29	24
Pinzon	58—76	65	74—139	106	9—24	17	117—165	149	36—41	38	44—66	52	21—33	27
SH-S-690	59—78	66	76—141	108	9—28	18	105—160	144	34—41	37	48—64	52	23—33	27
SH-3000×2	59—79	67	76—146	109	10—24	17	110—160	122	35—43	39	34—63	49	19—30	26
SH-72 M×1 161	58—76	66	75—134	108	8—25	18	113—158	140	35—43	37	40—63	51	20—32	26
Sunbred 265	58—79	68	77—148	113	8—24	16	106—150	127	37—44	39	42—65	53	20—28	25
Interstate 7775	61—79	70	78—148	112	10—22	18	104—180	149	34—45	41	45—61	52	22—34	27
DO-704	58—76	66	76—139	106	11—28	17	114—180	143	34—42	37	34—61	49	21—31	27
NS-H-33	67—84	74	83—148	116	12—30	18	108—178	142	39—48	42	29—53	43	21—35	28
NS-H-36	60—77	68	80—131	104	11—23	17	118—175	146	41—47	43	29—54	40	24—32	28
RO-29	61—82	69	80—139	111	13—26	19	116—180	146	39—46	42	39—63	54	20—27	24
RO-40	68—87	75	82—148	115	11—27	19	114—173	152	37—48	43	34—60	52	21—35	25
RO-45	69—87	77	86—148	119	11—24	18	116—170	154	37—46	42	32—73	52	20—30	24
RO-46	59—79	68	79—141	109	11—26	19	101—150	123	33—40	37	40—71	56	18—26	23
RO-100	64—83	71	79—140	109	11—20	18	106—170	146	36—42	40	48—65	56	19—30	23
RO-130	59—82	69	78—140	110	12—24	19	115—160	145	33—45	38	43—74	64	19—24	22
Gahib-6	62—80	70	79—136	112	14—23	19	139—191	165	34—42	40	52—60	55	21—28	25
Gahib-7	63—79	69	78—133	112	14—24	19	119—178	155	33—38	37	48—58	52	21—27	25

Table 8

TRIAL No. 2/1980—1981. Resistance to diseases and unfavourable conditions

Cultivars	*Plasmopara helianthi* (% diseased) pl.			*B. cinerea* (% diseased) pl.		*Puccinia helianthi*		*S. sclerotiorum* (% diseased)					Leaf spots (% diseased) pl.		Lodging						Bird damage (%)		
	Fundulea		Ireg.	Ireg.	Podu Iloaie	Casselton		Fundulea		Podu Iloaie	Szeged	Ireg.	Szeged	Casselton	Fundulea		Szeged		Edirne		Pisa	Elvas dry land	Elvas irrig.
						1980	—1981								1980		1980		1980				
	1980	1981	1980	1980	1981	note	%	1980	1981	1981	1980	1981	1981	1981	%	note	%	type	%	note	1980	1980	1980
Peredovik	13	26	59	17	10	1	10	13	22	11	8	51	15	10	30	3	33	2	20	9	56	50	40
Contiflor	30	—	0	30	—	1	—	7	—	—	5	—	—	—	15	1	21	2	0	0	—	—	—
Iregi 816 B	0	—	7	43	—	1	—	8	—	—	—	—	—	—	10	2	—	—	20	7	42	60	30
IH-10	0	—	3	40	—	1	—	5	—	—	—	—	—	—	15	2	—	—	20	8	72	60	40
Halcon	0	—	0	40	—	1	—	4	—	5	6	—	—	—	20	1	17	1	30	9	77	70	50
Pinzon	0	2	0	13	18	1	10	10	58	4	9	30	18	0	25	2	11	1	40	9	73	75	50
SH-S-690	0	1	0	23	3	0	0	7	2	3	6	42	10	0	10	1	14	1	4	9	74	60	20
SH-3000×2	2	3	2	27	7	0	0	2	11	2	0	45	17	20	10	1	0	0	5	3	82	75	50
SH-72 M×1161	19	12	0	40	2	1	0	0	0	5	0	49	0	10	0	0	18	1	0	0	69	60	40
Sunbred 265	0	1	0	60	3	0	10	4	4	4	0	47	10	10	15	1	0	0	4	9	46	60	40
Interstate 7775	0	0	0	27	2	1	0	8	23	2	4	43	10	20	10	1	16	1	0	0	55	30	20
DO-704	0	1	0	13	5	0	10	5	18	3	0	48	0	0	20	1	15	1	50	5	74	60	40
NS-H-33	0	0	0	30	5	1	0	11	14	6	6	29	0	20	5	1	0	0	0	0	69	60	50
NS-H-36	0	2	0	13	7	1	0	7	12	11	6	54	10	0	30	3	23	2	60	8	25	70	30
RO-29	0	0	2	23	12	1	20	4	2	5	5	49	0	0	10	1	17	2	9	9	45	30	15
RO-40	0	1	0	10	2	1	10	0	1	1	0	37	10	0	0	0	22	2	0	0	80	20	50
RO-45	0	0	0	10	4	1	10	6	6	2	5	37	0	0	0	0	16	2	0	0	98	60	50
RO-46	0	0	0	43	4	1	0	6	3	3	7	54	10	20	5	1	0	0	45	8	86	75	50
RO-100	0	1	2	10	3	1	0	0	2	2	6	44	10	0	0	0	26	2	0	0	77	60	50
RO-130	0	2	0	47	4	1	10	1	3	2	6	43	5	0	10	1	7	1	20	8	81	50	30
Gahib-6	—	8	—	—	3	—	0	—	31	3	—	44	18	10	—	—	—	—	—	—	—	—	—
Gahib-7	—	4	—	—	2	—	10	—	15	3	—	42	10	0	—	—	—	—	—	—	—	—	—

Table 9

TRIAL No. 3/1980—1981. Seed yield test (q/ha, 0 % moisture)

Cultivars	Romania	Turkey				Iran	Pakistan	Egypt				Israel		Algeria	Tunisia	Philippines		Tanzania	Mean
	Fundulea	Ankara	Luleburgaz	Yeşilköy		Karaj	Islamabad	Sakha		Elnaubaria		Volcani		Issers	Ariana	Muñoz		Mtwara	
	1980	1980	1980	1980	1981	1981	1980	1980	1981	1980	1981	1980	1981	1980	1980	1980	1981	1981	q/ha
Contiflor	37.4	24.7	27.8	16.3	—	—	17.5	26.1	—	26.1	—	32.1	—	27.1	18.2	44.9	—	14.6	26.1
Impira INTA	37.1	16.7	22.9	22.1	—	—	17.2	29.3	—	29.3	—	38.6	—	26.0	25.1	28.1	—	9.4	25.1
Guayacan INTA	37.3	18.8	25.3	16.3	—	—	13.2	29.7	—	29.7	—	32.1	—	27.0	17.3	27.5	—	9.1	23.6
Halcon	35.0	19.3	18.6	15.4	—	—	13.5	21.8	—	21.8	—	24.6	—	20.0	22.1	25.7	—	—	21.6
Peredovik	36.1	16.8	20.2	22.8	—	—	14.7	25.6	3.6	25.6	3.6	29.9	24.0	17.9	16.0	46.0	23.4	8.6	20.9
RO-40	35.8	27.3	24.5	13.7	5.8	22.9	13.7	27.3	4.9	27.3	4.4	34.9	19.9	22.9	25.9	21.9	24.2	5.7	20.2
RO-45	33.1	—	—	8.5	—	—	17.3	22.2	—	22.2	—	31.6	—	—	13.8	23.7	—	8.1	20.1
Tuscania	35.0	13.2	17.8	15.6	6.2	18.2	12.9	30.8	4.9	30.8	5.2	28.6	21.4	—	23.0	44.2	22.6	9.7	20.0
Sorem 82	38.1	21.0	21.6	15.1	4.5	24.3	16.4	29.5	4.2	29.5	4.1	23.5	24.4	19.6	18.8	22.3	25.8	8.4	19.5
SH-3000×2	33.0	21.7	20.4	10.2	—	—	9.6	22.0	—	22.0	—	23.8	—	23.7	14.0	22.6	—	8.2	19.3
Interstate 7775	36.0	21.2	19.9	24.6	3.8	17.7	13.6	24.3	3.3	24.8	3.7	31.7	23.6	17.9	23.3	21.8	25.0	8.4	19.1
NS-H-33	37.8	21.4	19.1	12.0	5.8	18.4	12.2	24.4	5.1	24.4	5.1	33.4	22.0	27.2	18.2	24.0	21.8	9.4	19.0
NS-317	32.5	18.2	22.2	12.6	6.5	15.7	11.9	25.3	4.3	25.3	4.4	26.6	21.3	17.2	18.2	44.8	22.6	7.2	18.7
Egnazia	32.6	16.1	16.9	17.8	5.2	19.2	9.1	24.6	5.1	24.6	5.2	25.5	21.5	19.6	25.2	27.1	22.6	—	18.7
Siponto	33.3	16.4	17.9	13.4	—	—	11.6	25.8	4.0	25.8	4.0	26.8	19.2	14.2	18.1	26.7	22.6	—	18.6
Sunbred 265	33.9	16.7	21.1	23.8	5.2	21.8	14.4	27.4	4.7	27.4	4.7	28.5	20.8	23.2	25.1	23.6	24.2	9.6	19.8
NS-H-36	37.6	20.5	20.8	19.0	5.5	21.5	10.7	22.6	5.3	22.6	5.8	25.1	20.8	22.9	25.0	22.0	13.7	10.1	18.4
Pemir	35.0	19.4	20.3	11.8	5.5	16.2	9.5	28.1	4.5	28.1	4.1	29.5	23.9	16.9	21.0	27.2	22.6	7.7	18.4
Cosmarema	32.0	18.3	19.8	15.3	6.2	16.8	26.7	27.5	4.2	27.5	4.2	27.1	19.6	—	23.1	44.2	20.2	—	20.8
RO-100	35.0	19.8	19.8	12.9	6.1	21.4	8.4	25.4	3.9	25.9	3.9	22.3	21.8	17.7	11.9	22.8	19.4	8.9	17.1
GK-70	—	—	—	—	5.2	19.7	—	—	4.5	—	4.5	—	20.3	—	—	—	22.6	—	12.8
Mean	35.2	19.3	20.9	16.0	5.5	19.5	13.7	26.0	4.4	26.0	4.4	28.8	21.6	21.3	20.2	29.5	22.2	8.9	19.9

Table 10

TRIAL No. 3/1980—1981. Oil content in dry matter (%)

Cultivars	Romania	Turkey			Iran	Egypt		Israel	Mean
	Fundulea	Ankara	Lule-burgaz	Yeşilköy	Karaj	Sakha	Elnau-baria	Volcani	%
	1980	1980	1980	1980	1981	1981	1981	1981	
RO-45	52.5	46.8	48.7	44.0	—	—	—	—	48.0
Peredovik	52.4	46.8	47.4	46.3	—	44.5	46.3	47.1	47.6
SH-3000×2	50.8	47.7	46.9	45.0	—	—	—	—	47.6
NS-317	50.7	46.5	46.6	46.1	47.7	45.2	45.4	45.6	46.7
RO-100	50.0	46.5	49.7	43.8	49.7	44.2	44.8	44.5	46.7
Sorem 82	48.5	45.3	46.0	45.2	45.7	48.9	48.1	43.1	46.4
Sunbred 265	50.8	44.6	47.6	45.3	47.3	44.2	45.2	43.2	46.0
Pemir	48.8	46.8	48.0	44.8	48.7	43.6	40.7	46.1	45.9
Tuscania	50.4	45.1	46.3	43.3	47.0	43.3	46.1	46.1	45.5
GK-70	—	—	—	—	46.3	45.2	45.9	43.6	45.3
Cosmarema	50.4	44.6	45.8	46.2	46.3	42.3	43.9	42.4	45.2
RO-140	47.9	46.3	46.4	43.0	45.7	43.7	46.2	41.2	45.0
NS-H-33	47.9	43.2	46.2	42.9	45.3	43.0	46.4	40.3	44.4
Halcon	48.6	42.7	44.2	39.0	—	—	—	—	43.6
Egnazia	49.7	43.7	46.5	39.1	44.3	41.4	41.3	41.0	43.4
Interstate 7775	47.2	42.3	44.1	42.8	45.7	40.1	41.6	42.7	43.3
Siponto	46.3	40.4	42.4	41.3	—	41.1	44.5	42.2	42.6
Contiflor	43.7	39.8	39.6	46.8	—	—	—	—	42.5
NS-H-36	45.4	41.5	42.1	44.7	43.7	38.7	43.8	40.3	42.5
Guayacan INTA	43.8	37.7	41.8	38.7	—	—	—	—	40.5
Impira INTA	41.3	36.5	35.5	37.8	—	—	—	—	37.8
Mean	48.4	43.7	45.1	43.3	46.4	43.3	44.7	43.0	44.6

Table 11

TRIAL No. 3/1980—1981. Morpho-physiological characteristics

Cultivars	No. of days from emerg. to :				Head diam. (cm)		Plant height (cm)		Volume weight (kg/hl)		1,000 k weight (g)		Husk %	
	flowering		maturity		limits	mean	limits	mean	limits	mean	limits	mean	limits	mean
	limits	mean	limits	mean										
Peredovik	34—98	79	68—126	110	11—23	19	140—178	154	35—38	37	45—93	71	21—28	25
Impira INTA	38—103	90	77—133	125	14—24	20	148—200	177	39—45	40	35—64	54	35—40	37
Guayacan INTA	52—100	95	97—137	128	14—25	20	156—208	180	37—50	41	39—73	64	32—44	36
Siponto	53—105	79	74—124	112	14—25	18	110—172	144	35—39	36	39—84	66	27—32	29
Egnazia	32—90	74	70—121	108	12—21	18	94—173	142	34—38	37	46—94	66	23—31	27
Tuscania	32—96	73	69—125	106	12—23	19	138—177	147	35—39	38	48—83	65	22—36	27
Cosmarema	32—97	73	67—124	106	11—25	20	121—175	154	36—40	38	49—86	67	22—28	25
Pemir	33—95	75	66—124	109	12—23	18	134—174	156	37—40	38	53—76	63	31—32	25
NS-317	36—98	79	72—124	107	10—22	19	137—182	154	36—41	38	48—73	62	20—30	24
Contiflor	39—98	85	77—128	117	18—22	20	133—184	162	36—47	40	38—83	62	25—41	33
Halcon	50—107	78	83—148	103	13—21	17	130—151	137	39—43	41	40—71	49	26—36	32
SH-3000×2	32—90	74	69—118	102	12—20	16	104—138	128	39—43	42	42—65	51	23—41	29
Sunbred 265	32—92	74	67—118	104	8—20	15	88—151	112	36—40	39	49—62	53	24—35	27
Interstate 7775	31—90	76	37—118	106	10—21	17	112—174	133	40—43	42	39—65	49	26—33	28
NS-H-33	33—96	79	70—127	113	11—22	19	120—161	138	39—43	41	34—54	46	25—42	32
NS-H-36	36—98	78	73—118	112	9—20	18	105—166	129	40—44	43	35—56	44	26—40	31
RO-40	48—93	79	79—118	113	13—22	20	92—173	134	41—44	41	37—69	50	24—32	27
RO-100	38—101	80	71—126	112	12—22	20	96—167	130	39—43	43	43—55	52	22—31	25
Sorem 82	39—98	78	72—127	112	12—23	20	100—173	137	38—43	40	41—73	56	23—40	26
RO-45	38—98	80	72—133	114	13—22	19	113—167	138	40—44	41	45—56	49	22—34	25

Table 12

TRIAL No. 3/1980—1981. Resistance to diseases and unfavourable conditions

Cultiivars	*Plasmopara helianthi* (%)		*Puccinia helianthi* %	*S. sclerotiorum* (% diseased) pl.	Lodging			
	Fundulea 1980	Ankara 1980	Volcani 1980	Fundulea 1980	Fundulea 1980		Volcani 1980	
	nat. inf.	nat. inf.			%	note	%	note
Peredovik	10	22	5	6	25	2	21	1
Impira INTA	15	26	3	7	30	3	21	2
Guayacan INTA	13	4	2	8	20	2	23	1
Siponto	0	0	2	5	15	1	14	1
Egnazia	10	10	5	10	15	2	17	1
Tuscania	9	15	6	8	30	2	20	2
Cosmarema	47	27	6	5	20	2	16	1
Pemir	20	11	4	9	25	2	30	1
NS-317	14	1	3	11	30	3	16	3
Contiflor	28	11	0	3	35	1	19	1
Halcon	0	0	5	0	10	1	13	1
SH-3000×2	3	0	4	3	0	0	5	1
Sunbred-265	0	1	3	7	20	1	15	1
Interstate 7775	0	0	5	2	10	2	9	3
NS-H-33	0	0	2	6	10	1	9	2
NS-H-36	0	0	5	7	15	2	11	2
RO-40	0	0	2	0	0	0	7	1
RO-100	0	0	2	1	0	0	11	1
Sorem 80	0	0	1	3	10	1	15	1
RO-45	0	0	0	0	0	0	10	1

No information about resistance to diseases, insects and unfavourable conditions was received for this trial.

The multitude of data obtained has allowed an interesting analysis of correlations between certain environmental characteristics and various yield components or plant traits (Table 15). Thus, it has been found :

— a strong and highly significant positive correlation between total precipitations from emergence to flowering and seed yield and plant height and a strong and significant negative correlation of the same variable with head sterility (empty seeds) ;

— oil percent and head sterility display a strong negative correlation with precipitations from flowering to maturity ;

— head sterility is also in a significant negative correlation with total maximum temperature from emergence to flowering and to maturity ;

— total mean relative humidity from emergence to flowering and from flowering to maturity has influenced significantly and positively the seed yield and plant height.

CONCLUSIONS AND SUMMARY

The results presented in this paper may be an useful guide for sunflower growers interested in the identification of the best genotypes for their specific climatic and soil conditions, or interested in determining the optimum biological parameters of sunflower crop.

The two year experimentation of a great number of hybrids (35) and open-pollinated varieties (12) by 28 research institutions from 24 countries, revealed a very different reaction of most cultivars to the extremely varied environments.

Under favourable environments, the highest, constant seed and oil yields performed : Ro-34, Ro-27, Ro-19, NS-H-10 (Trial No. 1) and Ro-29, Ro-40, Ro-130, Gahib 6 (Trial No. 2).

In less favourable conditions, as those of Near and Middle-East, Africa, Central and South America, the best results have been obtained with : Contiflor, Impira INTA, Guayacan INTA, Ro-45, Peredovik, SH-3 000×2 (Trials No. 3 and No. 4). Most of these cultivars were however very tall, late and possessed a low seed oil content.

As compared to open-pollinated varieties, most sunflower hybrids presented a shorter plant height and vegetation period, a better

Table 13

TRIAL No. 4/1980—1981, 1981—1982. Seed yield (q/ha, 0 % moisture), oil content in dry matter, and husk percentage

Cultivars	Seed yield				% oil	% husk
	Argentina Miramar		Chile Platina Santiago	Mean (q/ha)	Argentina Miramar	Argentina Miramar
	1980—1981	1981—1982	1980—1981		1980—1981	1981—1982
GK-70	—	38,2	—	38.2	—	25
H-894	—	37.5	—	37.5	—	31
Sorem 82	20.2	47.8	26.1	31.4	46	26
RO-100	19.7	44.3	21.1	28.4	48	27
Sunbred 265	19.3	42.8	22.8	28.3	48	28
NS-317	18.4	43.3	22.4	28.0	46	26
Tuscania	20.1	39.3	23.4	27.6	45	26
Pemir	21.2	37.8	22.7	27.2	47	26
Cosmarema	21.9	37.8	20.8	26.8	45	25
NS-H-36	14.6	43.3	22.5	26.8	40	30
RO-45	18.6	44.0	17.7	26.8	50	30
Peredovik	18.8	39.0	11.7	26.5	47	26
Pinzon	17.2	37.0	24.6	26.3	42	29
NS-H-33	21.3	40.5	16.8	26.2	48	27
Contiflor	23.8	—	28.4	26.1	44	—
RO-40	18.6	37.3	22.1	26.0	46	29
Siponto	19.3	34.0	22.5	25.3	42	27
Interstate 7775	22.7	—	25.9	24.3	47	—
Impira INTA	22.4	—	25.7	24.1	40	—
Decalb G-98	19.0	—	24.0	21.5	45	—
Egnazia	18.1	—	24.1	21.1	44	—
Halcon	13.2	—	23.8	18.5	41	—
Mean	19.4	40.2	23.0	27.3	—	—

resistance to diseases and lodging, and a better uniformity of all plant and seed characteristics.

Strong and significant positive correlations have been put in evidence between total precipitations from emergence to flowering and seed yield and plant height, and significant negative correlation of the same variable with head sterility (empty seeds). Oil percent and head sterility have been in a strong negative correlation with precipitations from flowering to maturity. Head sterility proved to be also in a significant negative correlation with total maximum temperature from emergence to flowering and to maturity. Seed yield and plant height have been influenced significantly and positively by total mean relative humidity from emergence to flowering and from flowering to maturity.

RÉSULTATS DE L'EXPÉRIMENTATION EN RÉSEAU DES CULTIVARS DE TOURNESOL DANS LE CYCLE BIENNAL 1980—1981

Résumé

Les résultats présentés dans ce travail peuvent représenter un guide util pour les cultivateurs de tournesol intéressés dans l'identification des plus précieux génotypes pour les conditions spécifiques de climat et de sol de la région considérée, ou dans la détermination des paramètres biologiques optimaux de la culture du tournesol.

L'expérimentation à la durée de 2 années d'un grand nombre d'hybrides (35) et variétés-populations (28) à l'aide de 28 institutions de 24 pays a mis en évidence une réaction très differente de la majorité des génotypes vis-à-vis des conditions de l'environnement extrêmement variées. Dans les conditions les plus favorables, les rendements en graines et en huile les plus élevés et constants ont été enregistrés avec les hybrides suivants : Ro-22, H-27/77, NSH-13, Ro-34, Ro-27, Ro-19, NSH-10 (Essai no. 1) et Ro-29, Ro-40, Ro-130, Gahib 6 (Essai no. 2).

Dans des conditions moins favorables, comme celles du Proche Orient, Afrique, Amérique Centrale et du Sud, les meilleurs résultats ont été obtenus par les cultivars : Contiflor, Impira INTA, Guayacan INTA, Ro-45, Peredovik, SH-3 000×2 (Essais no. 3 et 4). La plupart de ceux-ci sont pourtant des variétés-populations très hautes et tardives et à une teneur très faible en huile dans les graines.

En comparaison avec les variétés-populations, la majorité des hybrides de tournesol ont eu la taille des plantes et la période de végétation plus courtes, une meilleure résistance aux maladies et à la verse des plantes et une uniformité plus accentuée de toutes les caractéristiques de la plante et des graines.

Des corrélations positives fortes et significatives ont été mises en évidence entre le total des précipitations, dès les semailles jusqu'à la floraison, d'un côté, et le rendement en graines et la taille des plantes, d'un autre côté, aussi bien que des corrélations significatives et négatives entre la même variable et la stérilité du capitule (les graines vides). La teneur en huile et la stérilité du capitule ont été dans une corrélation négative forte avec les précipitations commençant dès la floraison jusqu'à la maturité. La stérilité du capitule s'est révélée être aussi dans une corrélation négative significative avec la temperature maximale entre la levée et la floraison et à la maturité. Le rendement en graines et la taille des plantes ont été influencés positivement et significativement par l'humidité relative moyenne totale entre la levée et la floraison et de la floraison jusqu'à la maturité.

Table 14

TRIAL No. 4/1980—1981, 1981—1982. Morpho-physiological characteristics

Cultivars	No. of days from emerg. to :				Head diam. (cm)		Plant height (cm)		Volum weight (kg/hl)		1 000 k. weight (g)	
	flowering		maturity									
	limits	mean	limits	mean	limits	mean	limits	mean	limits	mean	limits	mean
Peredovik	73—82	78	115—139	127	15—19	17	160—178	169	25—37	32	56—60	58
Impira INTA	90—92	91	134—145	140	12—14	13	195—231	213	33—36	35	46—50	48
Interstate 7775	71—82	77	119—120	120	16—20	18	167—175	171	23—36	31	45—54	50
Siponto	71—82	77	113—121	117	16—18	17	140—166	153	27—38	35	55—67	60
Tuscania	75—92	84	118—139	130	15—18	17	148—183	169	28—39	34	57—63	60
Cosmarema	75—90	83	129—139	134	15—17	16	142—180	176	28—37	34	53—71	63
Pemir	77—96	87	129—139	134	16—18	17	161—185	183	31—38	34	55—69	62
NS-317	77—96	87	129—139	134	16—18	17	178—205	198	27—40	35	47—62	56
Contiflor	87—92	90	134—144	139	16—18	17	200—213	207	34—36	35	47—61	54
Decalb G-98	68—76	72	113—116	115	16—18	17	159—160	160	32—36	34	46—48	47
Halcon	70—73	72	111—116	114	15—16	16	140—165	148	31—32	32	37—51	44
Pinzon	70—79	75	110—112	111	14—16	15	130—150	140	25—40	33	45—59	50
Sunbred 265	69—81	75	116—120	118	15—17	16	116—140	140	29—42	37	50—55	53
Egnazia	73—88	81	120—126	123	15—17	16	140—187	164	32—35	34	44—60	52
NS-H-33	74—79	77	117—129	123	14—19	17	137—175	170	34—42	38	34—41	37
NS-H-36	69—89	79	108—126	117	15—17	16	142—165	160	34—42	37	37—47	42
RO-40	74—96	85	122—129	126	17—19	18	124—192	171	35—44	40	41—50	46
RO-45	76—85	81	122—134	128	14—17	16	145—190	175	33—41	37	36—49	45
RO-100	76—85	81	120—126	123	16—20	18	148—175	168	31—40	37	46—47	47
Sorem 80	74—79	77	120—126	123	17—19	18	150—185	168	31—38	35	46—54	51
GK-70							—	154	—	38		63
H-894							—	130	—	42		42

Table 15

Correlation coefficients between some environmental factors and the most important components of yield and plant characters

Environmental factors Comp. of yield and plant characters	Seed yield	Plant height	Head diam.	Partial sterility (empty seeds)	Grain moist.	Volume weight	1 000 kernel weight	% oil in dry matter
Total precipitation from emergence to flowering	0.73*	0.82*	0.14	—0.76*	0.47	0.16	0.23	0.09
Total precipitation from flowering to maturity	0.31	0.25	0.21	—0.77*	—0.06	—0.37	0.19	—0.54*
Total mean temperature from emergence to flowering	—0.02	0.32	—0.41	0.28	0.27	0.08	0.09	—0.32
Total mean temperature from flowering to maturity	0.36	0.40	—0.25	—0.09	0.29	—0.06	—0.17	—0.17
Total maximum temperature from emergence to flowering	0.11	0.12	0.21	—0.77*	—0.17	—0.25	—0.03	—0.04
Total maximum temperature from flowering to maturity	0.19	0.14	0.24	—0.77*	—0.14	—0.27	—0.06	—0.04
Total maximum temperature from emergence to flowering	—0.09	0.33	—0.34	0.02	0.23	0.03	0.22	—0.37
Total minimum temperature from flowering to maturity	0.41	0.44	—0.22	—0.24	0.32	—0.06	—0.21	—0.15
Total mean relative humidity from emergence to flowering	0.68*	0.63*	0.09	—0.42	0.18	0.31	—0.27	0.36
Total mean relative humidity from flowering to maturity	0.75*	0.60*	0.25	—0.65	0.26	—0.01	—0.20	0.04
Total mean sunshine duration from emergence to flowering	0.44	0.27	—0.33	0.04	0.58	0.38	—0.09	0.22
Total mean sunshine duration from flowering to maturity	0.47	0.34	—0.29	—0.09	0.61	0.39	—0.14	0.24

LOS RESULTADOS DE LA EXPERIMENTACIÓN EN LA RED DE LOS CULTIVARES DE GIRASOL EN EL CICLO BIENAL 1980—1981

Resúmen

Los resultados presentados en este trabajo pueden ser un guía de los cultivadores de girasol interesados en identificar los mejores genotipos para sus condiciones climáticos y de suelo específicas, o bien interesados en determinar los parámetros biológicos óptimos de la cosecha del girasol.

La investigación durante dos años de un gran número de híbridos y variedades de polinización directa (12) de 28 instituciones de investigación de 24 países, ha mostrado una reaccíón muy diferente de la mayoría de los cultivares a los extremadamente variados ambientes.

Bajo ambientes favorables las más altas, constantes producciones de semillas y aceite han resultado Ro 34, Ro 27, Ro 19, NSH-10 (experimento No. 1) y Ro 29, Ro 40, R 130, Gahib 6 (experimento No. 2).

Bajo menos favorables condiciones, como aquellas del Oeste Medio y Cercano, Africa, América Central y del Sur, los mejores resultados se han obtenido con : Contiflor, Impira INTA, Guayacan INTA, Ro 45, Peredovik, SH-3 000×2 (Experimentaciones No. 3 y No. 4). Sin embargo, la mayoría de estos cultivares fueron muy altos, tardíos y de un contenido reducido de aceite en semilla.

En comparación con las variedades de polinización directa, muchos híbridos de girasol mostraron una altura menor de las plantas, más corto período de vegetación, resistencia mayor a enfermedades y caidà y una mayor uniformidad de todas las características de las plantas y de las semillas.

Correlacciones fuertes y de sentido positivo se han puesto en evidencia entre precipitaciones totales desde la aparición hasta la floración y producción de semilla y crecimiento de la planta y correlaciones de sentido negativo de la misma variable con esterilidad de la cabezuela (semillas huecas).

El porcentaje de aceite y la esterilidad de la cabezuela han estado en una fuerte correlación negativa con las precipitaciones entre la floración y la madurez. La esterilidad de la cabezuela ha probado estar también en una correlación negativa con la temperatura máxima total desde la aparición hasta la floración y la madurez. La producción de semilla y el crecimiento de la planta han sido influenciados de modo significativo y positivo por una humidez relativa escasa desde la aparición hasta la floración y desde la floración hasta la madurez.