PERSPECTIVES OF SUNFLOWER PRODUCTION IN THE SOUTHERNMOST PART OF BRAZIL

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Abstract

The southernmost region of Brazil (Rio Grande do Sul State) lies between 27°S and 33°S, the most productive areas being located between 27°S and 30°S. Average annual precipitation range from 1300 to 1700 mm, distributed along the year. Average temperature varies from 25°C (January) to 11° (July). Sunflower can be grown from August to April in the warmest areas (low altitude). Best results have been obtained when the crop is established during August/ September. Besides better yields and oil content (35 to 40%), disease incidence is low and the frequently occuring mid-summer short dry-period can be avoided. Harvest can be proceeded during December-January, allowing a second summer crop in the same growing season. Seeding after October results in low yields an low oil content. This is due to higher disease incidence (mainly rust) and low rainfall. If seeding is done late in the season (January), the cooler temperatures can restrict yield and oil accumulation. There are good perspectives to reintroduce the sunflower crop in this area based on adequate yields (2000 to 3000 kg/ha in experimental plots) and high oil content. By antecipating the seeding date, some of the problems that determined the decline of the crop in the past can be avoided. Harvest date makes seeds available for processing in a period of high demand by the oil extraction industry.

Introduction

The southernmost part of Brazil (Rio Grande do Sul and Santa Catarina States) comprises the region between the Atlantic Ocean (east), Paraguai and Argentina (west) and Uruguai (south) and lies between the latitudes of 27 and 30°S (Figure 1). It is an area of intensive agriculture specially between 27 and 30°S, where basaltic derived soils have medium fertility level and good physical conditions.

Average temperature varies from 25°C in January to 11°C in July, depending on altitude. Temperature regime allows for the establishment of small-grain crops in May-June and a summer-crop in September to November on.

Main crops in the region are soybean, corn, wheat, rice, and cassava. The main cropping system utilizes double cropping of wheat and soybean, the first one sowed in the autumn, followed by soybean in the summer. Rice is cultivated in lowland areas under irrigation, and corn and cassava in small properties as subsistence crops.

The favorable growing season for sunflower lasts nine-month. In low altitude areas with minor frost incidence in starts it August and ends up with early frosts in April. In this growing season the

crop can be sowed from August to January. In the past, seeding was performed during the second half of the period (October on).

Sunflower cultivation started in the late 1930's in the western areas, near the Argentina border. Maximum acreage was of only 15,000 hectares in 1969 and then started to decline, mainly due to lack of adapted varieties (all of them introduced from abroad) showing low oil content and susceptibility to several diseases.

Nowadays sunflower research is foccusing on better varieties with higher oil content since there is a great interest from the oil industry which could process the sunflower grains besides soybean as it usually does.

Due to the satisfactory perspectives of the crop, a research program is being developed to adapt new cultivars to cropping systems suitable to medium and small farms.

Material and Methods

Since 1980 a research program is being developed to delineate cropping systems for small and medium-size farms that are typical of the region.

Open-pollinated varieties and hybrids are being tested and evaluated for disease resistance, oil and grain production. Also seeding date trials, harvest techniques, double cropping and inter-cropping systems, and weed control methods are performed.

The genotypes tested are commercial hybrids (Continental, Cargill, DeKalb) as well as local and introduced open-pollinated varieties. The best ones are tested on several locations and seeding dates. These begin in August and extend up to January under rainfall conditions and suplemental irrigation.

Results and Discussion

Sunflower that is established during August and September, can be harvested during December and January, with a growth cycle of aproximately 100 to 120 days. When seeding is delayed, cycle is reduced (up to 85 - 95 days) and harvest can be done in March-April (Figure 2).

Better grain yields are obtained when the crop is established by the end of the winter (August-September) but, from then on they decrease drastically as sowing is delayed. Experimental data have shown productivities of 2,000 to 3,000 kg/ha in early seeding dates (Table 1). For January, the productivity falls to 300-500 kg/ha (Schiocchet et al., 1983).

Oil content follows more or less the trend of the grain yields (Table 1). For the beginning of the season the oil percentage range from 35 to 40%, progressively decreasing to an average of 25% for December-January seeding date (Schiocchet et al., 1983). The oil yield per hectare has been relatively high due to the favorable conjugation of better grain yields and oil content (Table 1).

Early seeding date permits harvesting to be proceeded by mid-summer when high temperatures allow a rapid grain drying in the field, thus favouring this operation. Early harvesting opens the possibility to establish a second summer crop in the same area and during the same season, contributing to an efficient land use and crop diversification (Figure 2).

The results obtained with early seeding date and crop rotation are being atributed to the avoidance from the normally occuring mid-summer drought period. When rainfall may decrease, sunflower is already in maturation. On the other hand, with the late sowing of soybeans and corn, a severe water stress can be avoided since their critical period for water supply will fall in the months with less probability of having low rainfall (Heckler, 1984; Schiocchet, 1982).

The high oil content is related to the temperature regime. By sowing early, the temperatures during grain filling period are mild and, consequently, more suitable for oil accumulation. When the grain formation period occurs during the warmest months (January and February) the oil content decreases.

The most occuring diseases are rust (**Puccinia helianthi**) and alternaria (**Alternaria** spp.). Plants of early seeding dates are virtually not affected by them (Schiocchet et al., 1981) but, as seeding is delayed, diseases increase their importance as a yield limiting factor. So far, insects have not been a great problem.

Finally, another favorable aspect for an early seeding is the possibility to obtain grain in a period of the year (January-February) when the industry is lacking any kind of grain for oil extraction since the soybean cro pis ready for harvest only during the months of March and April.

The results so far obtained showed that the potential for grain production with the change in seeding date to August-September is much higher than the traditional October-November date. Higher yields and oil content are the results of suitable temperature and rainfall regimes, together with small incidence of diseases.

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Table 1. Grain yield, oil content, oil yield, cycle and disease rating of two sunflower hybrids sown in four seeding dates during 1982/83. Guaíba, RS, Brazil.

Seeding Date	Contisol 711					Contisol				
	Grain yield	Oil content	Oil yield	Cycle	Disease	Grain yield	Oil content	Oil yield	Cycle	Disease
	kg/ha	%	kg/ha	days	rating	kg/ha	%	kg/ha	days	rating
10/09	2,683a*	41.8a	1,231	117	1 1/	3,100a	36,8a	1,151	131	1 1/
27/10	1,751 b	37.4 b	644	90	1	1,943 b	32.7 b	613	100	1
07/12	861 c	29,7 c	207	78	2.3	707 c	23.2 c	164	84	2.5
21/10	340 d	2/	2/	80	3.5	603 d	2/	2/	89	3.3

* Means (column) followed by the same letter are not statistically different according to Duncan test (5% level)

1/ Infection: 1 = 0%; 2 = 3%; 3 = 6%; 4 = 12% and 5 = 24% of the leaf area.

2/ Not determined.

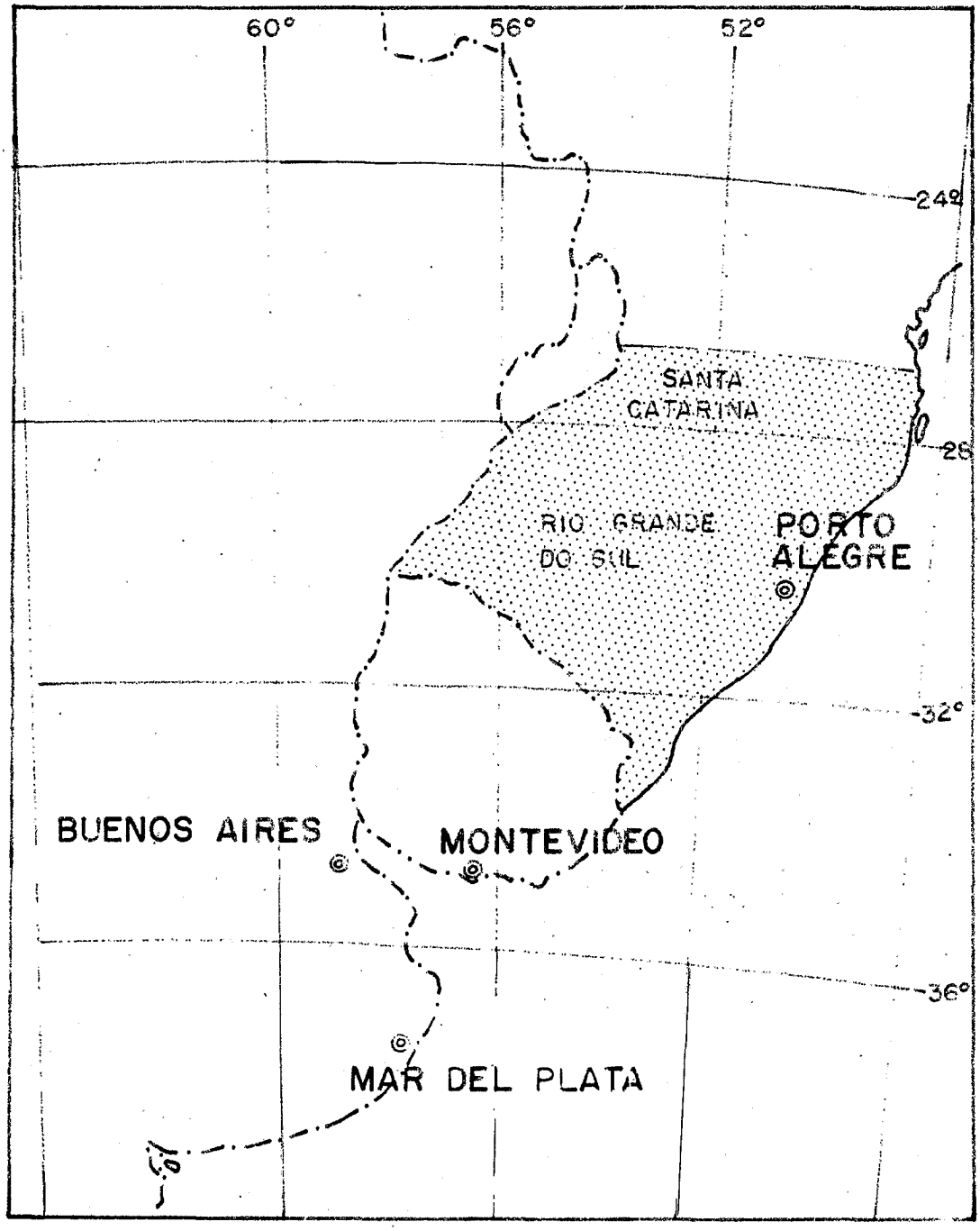

Figure 1. Map of the southernmost region of Brazil, Uruguai and part of Argentina.

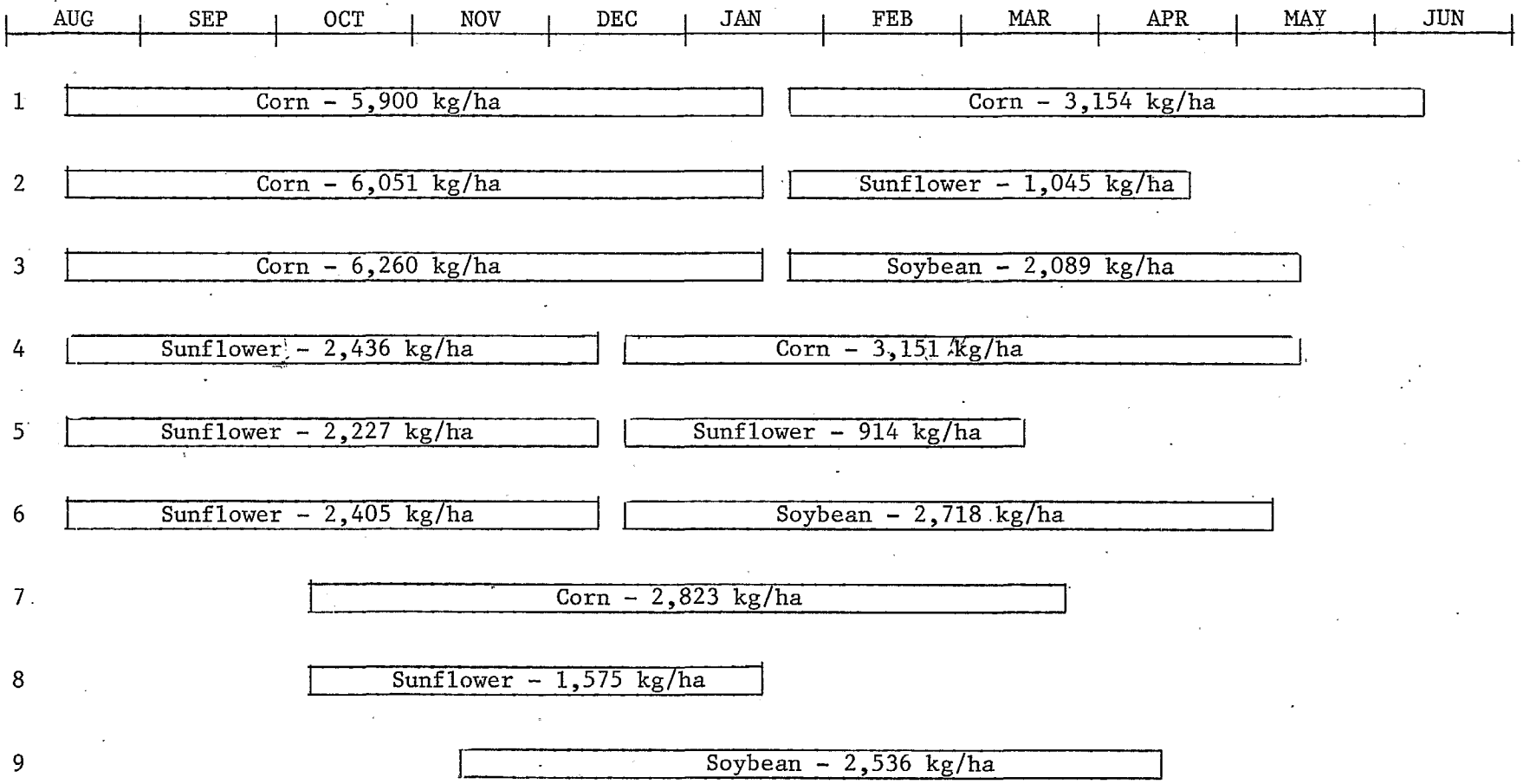

Figure 2. Grain yields of sunflower, soybean and corn in different cropping systems on the average of three growing seasons(1981/82, 1982/83, and 1983/84). Guaíba, RS, Brazil.