# Sunflower, Challenges and Emerging Issues in India

**V. Muralidharan[1], N. Manivannan[2] and C. Surendran[3]**
**Tamil Nadu Agricultural University, Coimbatore – 641 003**

**Preset :** India is one of the leading oilseed producing countries in the world occupying nineteen per cent of the world's area and ten per cent of world's production. However, the productivity in India is only 935 kg/ha (1998 – 99) as compared to the world level of 1632 kg/ha. In the domestic agricultural sector, oilseeds occupy a distinct position after cereals sharing fourteen per cent of the country's gross cropped area and accounting for nearly 6 per cent of the gross national product and ten per cent of the value of all agricultural products. About 14 million persons are engaged in the production of oilseeds and another one million in their processing. India ranks first in castor, safflower and sesame production and is the second largest producer of groundnut and ranks third, in linseed and rapeseed and mustard and fifth and sixth in soybean and sunflower respectively. India is blessed with diverse agro-ecological conditions ideally suited for growing nine annual oilseed crops *viz.*, groundnut, rapeseed- mustard, sunflower, sesame, soybean, safflower, castor, linseed and niger, two perennial oilseed crops (coconut and oil palm).

**1.1 India's Share in World Area and Production of Oilseeds (FAO 1998)**

| Crop | Average Area in 1994 – 1998 ('000 ha) | | (%) | Rank in Area | Average Production in 1994 – 98 ('000 MT) | | (%) | Rank in Production |
|---|---|---|---|---|---|---|---|---|
| | World | India | | | World | India | | |
| Linseed | 3260 | 935 | 28.69 | I | 2471 | 317 | 12.83 | III |
| Cotton Seed | 33854 | 8802 | 26.00 | I | 55568 | 7702 | 13.86 | III |
| Sesame | 6815 | 1992 | 29.23 | I | 2551 | 657 | 25.73 | I |
| Groundnut | 22944 | 7922 | 34.53 | I | 30158 | 8234 | 27.30 | II |
| Safflower | 1099 | 732 | 66.62 | I | 884 | 417 | 47.21 | I |
| Castor | 1267 | 800 | 63.14 | I | 1215 | 870 | 71.62 | I |
| Rapeseed-Mustard | 23483 | 6444 | 27.44 | II | 32932 | 5981 | 18.16 | III |
| Sunflower | 20302 | 2250 | 11.08 | III | 24319 | 1279 | 5.26 | VI |
| Soybean | 64806 | 5213 | 8.04 | V | 139057 | 5064 | 3.64 | V |
| Total : | 177829 | 35089 | 19.73 | | 289155 | 30520 | 10.55 | |

As far as the productivity is concerned castor tops the list with 1192 kg/ha followed by groundnut (1155 kg/ha), rapeseed –mustard (1013 kg/ha), soybean (995 kg/ha) and sunflower (714 kg/ha). The major annual oilseed crops growing states are Madhya Pradesh (23.2 %), Rajasthan (16.8 %), Andhra Pradesh (9.5 %), Gujarat (11.6 %), Karnataka (8.2 %), Maharashtra (10 %), Uttar Pradesh (6.5 %) and Tamil Nadu (5 %).

Major oilseeds producing states in India.

| Crops | States |
|---|---|
| Groundnut | Gujarat, Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra |
| Coconut | Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, West Bengal |
| Sesame | Gujarat, West Bengal, Tamil Nadu, Rajasthan, Uttar Pradesh |
| Castor | Gujarat, Rajasthan, Andhra Pradesh, Karanataka, Tamil Nadu |
| Sunflower | Karnataka, Andhra Pradesh, Punjab, Maharashtra, Harayana, Tamil Nadu |

The country's agricultural scenario undergone a rapid transformation leading to a spectacular performance on food front in the decade of 60's and 70's. The government of India established the Technology Mission on Oilseeds (TMO) in May, 1986. The oilseed production increased from a mere 10.83 million tonnes from 19.02 million hectares during 1985 – 86 to 25.68 million tonnes from 27.45 million hectares during 1998 – 99 due to series of synergistic and farmer – oriented programmes launched by the TMO along with better availability of crop production technologies, inputs services and support price policy. The oilseeds area, production and productivity in India have increased nearly by 2.7, 4.9 and 1.8 times respectively since 1949 – 50 (Damodaram and Hegde, 1999).

India's per capita consumption of oils and fats is continuously increasing. It has more than doubled in the last 15 years. The demand has been growing at the rate of about 6 per cent per annum in the last 13 years touching 12.5 million tonnes during 1998 – 99. Though we have attained self sufficiency during early nineties, since 1994, there has been continuous increase in imports reaching a staggering figure of 45 lakh tonnes during 1998 -–99 even with a domestic edible oil production of around 8 million tonnes. There is urgent need to step up production on a sustainable basis. Substantial scope for harnessing the potential of oilseeds exists both in terms of increase in cropped area and productivity (Economic survey– 1999).

The country wide experience through frontline demonstrations in oilseeds for the last ten years across wide growing conditions clearly indicates the possibility of increasing oilseed production. Different components like improved varieties (7 to 57 per cent increase), use of biofertilizers (12 per cent), chemical fertilizers (19 to

48 per cent), plant protection (18 to 73 per cent), planting time (54 per cent), sowing method (30 to 35 per cent), correct plant stand (19 to 65 per cent), thinning (22 to 84 per cent), irrigation (49 to 186 per cent), weed control (21 to 426 per cent), etc., have profound influence on the productivity in different oilseed crops. There exists a commercially exploitable yield reservoir to the tune of nearly 110 per cent of the existing national average yield which could be harnessed by the adoption of currently available improved technologies (Annual Report : 1998-99).

## 1.2 Impact of Technology Mission on Oilseeds in India

| Crop | Area (L.ha) | | Production (L.t) | | Yield (Kg/ha) | | Change during 1996-97 over 1987-88 (+) or (-) | | |
|---|---|---|---|---|---|---|---|---|---|
| | 19 87-88 | 1996-97 | 1987-88 | 1996-97 | 1987-88 | 1996-97 | Area | Prodn. | Yield |
| Groundnut | 67.35 | 78.14 | 56.73 | 90.23 | 842 | 1155 | +10.79 | +33.50 | +313 |
| | (33.7) | (29.1) | (29.1) | (36.2) | | | | | |
| Soybean | 16.81 | 52.27 | 9.8 | 52.02 | 583 | 995 | +35.46 | +42.22 | +412 |
| | (8.4) | (19.5) | (7.9) | (20.8) | | | | | |
| Sunflower | 16.57 | 19.95 | 6.1 | 13.15 | 368 | 659 | +3.38 | +7.05 | +291 |
| | (8.3) | (7.4) | (4.9) | (5.3) | | | | | |
| Safflower | 10.67 | 7.07 | 4.51 | 4.32 | 423 | 611 | -3.60 | -0.19 | +188 |
| | (5.3) | (2.6) | (3.7) | (3.7) | | | | | |
| Linseed | 11.51 | 8.45 | 3.72 | 3.25 | 323 | 385 | -3.06 | -0.47 | +62 |
| | (5.8) | (3.2) | (3.0) | (1.3) | | | | | |
| Rapeseed-Mustard | 45.08 | 68.56 | 33.7 | 69.42 | 748 | 1013 | +23.48 | +35.72 | +265 |
| | (22.5) | (25.6) | (27.2) | (27.8) | | | | | |
| Niger | 6.52 | 5.59 | 1.75 | 1.57 | 268 | 281 | -0.93 | -0.18 | +13 |
| | (3.3) | (2.1) | (1.4) | (0.6) | | | | | |
| Sesame | 20.97 | 20.6 | 5.62 | 6.73 | 268 | 327 | -0.37 | +1.11 | +59 |
| | (10.5) | (7.7) | (4.6) | (2.7) | | | | | |
| Castor | 4.53 | 7.48 | 1.85 | 8.91 | 408 | 1191 | +2.95 | +7.06 | 783 |
| | (2.2) | (2.8) | (1.5) | (3.6) | | | | | |
| Total Oilseeds | 200 | 268.11 | 123.78 | 249.6 | 619 | 931 | +68.11 | +125.82 | +312 |
| | (100) | (100) | (100) | | | | | | |

**1.3. Front line demonstrations (No.) in India; an appraisal.**

| | Crop | 1988–89 1997–98 | | | 1999 - 2000 | | |
|---|---|---|---|---|---|---|---|
| | | Rainfed | Irrigated / Rabi | Total | Rainfed | Irrigated / Rabi | Total |
| 1. | Groundnut | 1129 | 1036 | 2165 | NRCG – Junagadh | | .. |
| 2. | Rape seed Mustard | .. | 1527 | 1527 | NC - Raipur | | .. |
| 3. | Linseed | 1162 | .. | 1162 | .. | 145 | 145 |
| 4. | Niger | 525 | .. | 525 | 30 | .. | 30 |
| 5. | Safflower | .. | 518 | 518 | .. | 159 | 159 |
| 6. | Castor | 619 | 23 | 642 | 264 | .. | 246 |
| 7. | Sunflower | 205 | 406 | 611 | 33 | 39 | 72 |
| 8. | Sesame | 728 | 336 | 1064 | 76 | .. | 76 |
| | Total : | 4368 | 3846 | 8214 | 403 | 343 | 746 |

## 1.4. FLD : Categories of demonstrations (No.)

| | **Crop** | | | | |
|---|---|---|---|---|---|
| | | 1988 – 89 1997 - 98 | | | |
| | | WP | CS | CT | Total |
| 1. | Groundnut | 1893 | 102 | 170 | 2165 |
| 2. | Rape seed – Mustard | 1378 | 91 | 56+2* | 1527 |
| 3. | Linseed | 1026 | 63 | 70+3 | 1162 |
| 4. | Niger | 498 | 17 | 10 | 525 |
| 5. | Safflower | 240 | 115 | 68+95 | 518 |
| 6. | Castor | 507 | 55 | 80 | 642 |
| 7. | Sunflower | 466 | 18 | 127 | 611 |
| 8. | Sesame | 836 | 56 | 172 | 1064 |
| | **Total :** | **6844** | **517** | **853** | **8214** |

WP : Whole (complete) packages
CS : Cropping systems oriented

CT : Component technologies
* : Profitability of oilseed crops Vs Competing crops

### 1.5. Productivity improvement through different interventions in sunflower

| Intervention | Productivity improvement (%) | | | |
|---|---|---|---|---|
| | Rainfed | | Irrigated | |
| | Mean | Range | Mean | Range |
| Whole package | 38 | (19-99) | 37 | (16-99) |
| Fertilizer | 34 | (32-48) | 27 | (24-74) |
| Hand pollination | - | - | 21 | (4-31) |
| Improved variety / hybrid | 23 | (22-35) | 3 | (5-22) |
| Plant Protection | 33 | (32-34) | 26 | (14-32) |
| Sowing method | 23 | (12-34) | 41 | - |
| Spacing | 31 | - | 17 | (9-30) |
| Weed control | - | - | 21 | (12-29) |
| Intercropping systems* | 2920 | (2030-8597) | 4750 | |

* Additional net returns

### 1.6. Exploitable yield reservoir in Sunflower

| State | No. of demos | FLD Average yield (kg/ha) | | % increase | Average production (‘000 t) | Additional production (‘000 t) |
|---|---|---|---|---|---|---|
| | | IT | FP | | | |
| Karnataka | 59 | 1330 | 1001 | 33 | 354.0 | 117 (471) |
| Maharashtra | 208 | 1190 | 865 | 38 | 249.0 | 95 (344) |
| Orissa | 10 | 1561 | 1279 | 22 | 3.0 | 0.7 (3.7) |
| Punjab | 28 | 1895 | 1595 | 19 | 132.0 | 25 (157) |
| Tamil Nadu | 68 | 1670 | 1221 | 37 | 26.2 | 10 (36) |
| Uttar Pradesh | 93 | 1402 | 921 | 52 | 40.6 | 21 (62) |
| All India | 466 | 1370 | 998 | 37 | 1170.2 | 433 (1603) |

(Total yield realizable with adoption of improved technologies is given in parenthesis)

The production of oil seed in recent years has assumed paramount importance because of the following reasons : 1) The internal demand for edible oils and oil products has increased owing to the fast increase in population and associated per capita consumption, consequent to the rise in standard of living. 2) The rapid industrialisation had a positive impact on the internal demand of oil seeds. 3) To encourage exports so as to earn the much needed foreign exchange to finance the developing economy. 4) Oil seeds and their products constitute an important source of revenue. It sustains an internal trade of Rs. 900 crores and an export trade of Rs. 375 crores annually and 5) The oil seed crushing industry offers employment to large number of workers on a cottage industry basis.

Since oil seeds are the major source of edible oil in India, their production affects the domestic availability of edible oil in a big way. The continued stagnation in oil seed production on one hand and the steady mounting of demand for edible oil on the other hand, has led to an ever widening gap between their supply and demand. The over all deficit of edible oil in the country fluctuates from three lakh tonnes in good years and eight lakh tonnes in bad years. This gap is filled up either by imports or by soaring prices.

**1.7. ACHIEVEMENTS IN ANNUAL OILSEEDS PRODUCTION IN INDIA**

| Year | Target (Million tonnes) | Achievement (Million tonnes) | Gap |
|---|---|---|---|
| 1986-87 | 14.8 | 11.27 | -3.53 |
| 1987-88 | 14.0 | 12.65 | -1.35 |
| 1988-89 | 15.6 | 18.03 | 2.43 |
| 1989-90 | 16.5 | 16.92 | 0.42 |
| 1990-91 | 18.0 | 18.61 | 0.61 |
| 1991-92 | 17.5 | 18.60 | 1.10 |
| 1992-93 | 19.0 | 20.11 | 1.11 |
| 1993-94 | 21.0 | 21.50 | 0.50 |
| 1994-95 | 21.6 | 21.34 | -0.26 |
| 1995-96 | 22.5 | 22.10 | 0.40 |
| 1996-97 | 23.0 | 24.86 | 1.96 |
| 1997-98 | 25.5 | 21.32 | -4.18 |
| 1998-99 | 27.0 | | |

| | |
|---|---|
| 1999-2000 | 28.0 |
| 2000-2001 | 29.0 |
| 2001-2002 | 30.0 |
| 2006-2007 | 42.7 |
| (Xplan) | |
| 2007-2008 | 45.0 |
| (Action Plan) | |

## 1.8. Minimum Support Prices for Oilseeds

Minimum support price (Rs. per Quintal) for Fair Averages Quality (FAQ)

| Crop Year | Groundnut in Shell | Rape-seed | Toria | Soybean (Yellow) | Soybean (Black) | Sunflower | Safflower | Sesame | Niger |
|---|---|---|---|---|---|---|---|---|---|
| 1981-82 | 270 | xxx | xxx | 230 | 210 | 250 | xxx | xxx | xxx |
| 1985-86 | 350 | 400 | xxx | 275 | 250 | 335 | 400 | xxx | xxx |
| 1990-91 | 580 | 600 | 545 | 400 | 350 | 600 | 575 | xxx | xxx |
| 1995-96 | 900 | 860 | xxx | 680 | 600 | 950 | 800 | 850 | 700 |
| 2000-2001 | 1220 | xxx | xxx | 865 | 775 | 1170 | xxx | 1300 | 1025 |

(Economic survey : 2001)

## 2. Status of Tamil Nadu :

Tamil Nadu ranks sixth in the production of annual oilseed crops accounting for 8.5 per cent of the country's production. It is the second largest producer of groundnut and coconut and ranks third in sesame, fifth and sixth in castor and sunflower production respectively. In Tamil Nadu groundnut, sesame and sunflower are the three major oilseed crops. The area under oilseeds has remained around 12 lakh hectares for the past 20 years. As far as the oilseeds crops are concerned groundnut occupies a major area followed by gingelly, sunflower and castor.

After the formation of this university research work is being carried out on the region specific needs at the following centres on the crops mentioned against them.

1. **Coimbatore** : Sunflower, groundnut and sesame
2. **Vridhachalam** : Groundnut and sesame
3. **Tindivanam** : Castor, groundnut and sesame
4. **Aliyarnagar** : Groundnut and coconut
5. **Bhavanisagar** : Groundnut and sunflower
6. **Paiyur** : Niger
7. **Sandhiyur** : Castor
8. **Kovilpatti** : Sunflower
9. **Veppankulam** : Coconut
10. **Mettupalayam** : Tree Oilseeds

As a result of the various studies undertaken on breeding and development of varieties in each of the oilseed crops mentioned, many high yielding varieties have been developed and released for cultivation to the farmers as given below.

| Sl. No | Station | Crop varieties (no.) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Groundnut | Sesamum | Castor | Sunflower | Coconut | Safflower | Niger | Paradise tree |
| 1. | Tindivanam | 12 | 6 | 6 + 1@ | - | - | - | - | - |
| 2. | Coimbatore | 4 | 1 | 1 | 4 + 1@ | - | 1** | - | - |
| 3. | Vridhachalam | 5 | 1 | - | - | - | - | - | - |
| 4. | Pollachi | 2 | - | - | - | - | - | - | - |
| 5. | Aliyarnagar | 3 | - | - | - | - | - | - | - |
| 6. | Bhavanisagar | 1 | - | - | - | - | - | - | - |
| 7. | Paiyur | - | 1 | - | - | - | - | 1 | - |
| 8. | Kovilpatti | - | - | - | 2 | - | 1** | - | - |
| 9. | Srivilliputhur | - | 1 | - | - | - | - | - | - |
| 10. | Karur* | - | 2** | - | - | - | - | - | - |
| 11. | Salem | - | - | 2 | - | - | - | - | - |
| 12. | Veppankulam | - | - | - | - | 3@ + 1 | - | - | - |
| 13. | Hosur* | - | - | - | - | - | - | 1** | - |
| 14. | Mettupalayam | - | - | - | - | - | - | - | 1 |
| | **Total** | **27** | **12** | **9 + 1@** | **6 + 1 @** | **4** | **2** | **2** | **1** |

* Station closed, ** Obsolete varieties, @ Hybrid ***TOTAL : 65***

Kannaiyan *et al*. 2001)

## 3. Sunflower :

***"A golden girl of America went to Europe with early European explorers, eventually reached Russia and returned as Golden Angel".***

***"Sunflower is a difficult crop with tremendous scope"***

Sunflower is the third important major edible oilseed crop in the world after soybean and groundnut. The significant developments that took place in varietal front and remarkable ability of the crop to adjust and grow successfully in different agro climates expanded sunflower production to all the continents.

### 3.1 Distinct merits of sunflower :

1. Wider adaptability to wide ranging agro – climatic situations.
2. High yield potential of the hybrids
3. Suitability for cultivation in all seasons due to its day neutral nature.
4. Being a short duration crop, it can fit into various inter and sequence cropping systems.
5. Remunerative market price due to high quality oil.
6. Low seed rate (6-7 kg/ha) and high seed multiplication ratio (1 : 80) (Muralidharan, 1996).

### 3.2 Advantages of sunflower hybrids :

Hybrid sunflower offers following distinct advantages over open pollinated varieties.

1. Hybrids have more production stability and are suited for input intensive agriculture.
2. They are superior in their seed filling ability and are suited for input intensive agriculture.
3. The crop stand is uniform and facilitates easy harvesting. The harvested produce is also uniform.
4. They are more tolerant to disease and pests (Seetharaman, 1982).

### 3.3 TAMIL NADU :

In Tamilnadu, sunflower is grown in an area of 33,000 ha with the production of 34,000 tonnes. The average productivity of this crop is 1040 kg/ha. At present, the sunflower research is being carried out at Coimbatore and Bhavanisagar research stations of Tamilnadu Agricultural University.

Distribution of sunflower in Tamil nadu : Southern zone : 43.2%, North Western zone : 32.8 % ,western zone : 24.0 % of the total area .

**3.4 All India Area, Production and Yield of Sunflower**

| Year | Area (000 ha) | Production (000 t) | Yield (kg/ha) |
|---|---|---|---|
| 1970-71 | 117 | 76 | 650 |
| 1975-76 | 312 | 208 | 666 |
| 1980-81 | 119 | 66 | 555 |
| 1985-86 | 752 | 281 | 374 |
| 1990-91 | 1633 | 873 | 535 |
| 1995-96 | 2121 | 1258 | 593 |
| 1998-99 | 2004 | 1170 | 584 |

**3.5.1 State wise status of sunflower in India :**

| State | 1970 – 71 | | | 1980 - 81 | | |
|---|---|---|---|---|---|---|
| | Area (000'ha) | Production (000't) | Productivity (kg/ha) | Area (000'ha) | Production (000't) | Productivity (kg/ha) |
| 1. Andhra Pradesh | 23.6 | 9.6 | 407 | 1.9 | 0.9 | 474 |
| 2. Karnataka | 15.6 | 2.5 | 160 | 37.7 | 16.5 | 438 |
| 3. Tamil Nadu | 77.6 | 64.2 | 827 | 5.5 | 2.6 | 473 |
| 4. Maharastra | - | - | - | 63.3 | 39.9 | 630 |
| All India | 116.8 | 76.3 | 853 | 119.4 | 66.3 | 555 |

**3.5.2 State wise status of sunflower in India :**

| State | 1990 – 91 | | | 1998 - 99 | | |
|---|---|---|---|---|---|---|
| | Area (000'ha) | Production (000't) | Productivity (kg/ha) | Area (000'ha) | Production (000't) | Productivity (kg/ha) |
| 1. Andhra Pradesh | 162.5 | 139.4 | 858 | 374.0 | 237.0 | 634 |
| 2. Karnataka | 895.1 | 369.8 | 413 | 948.0 | 354.0 | 373 |
| 3. Tamil Nadu | 20.4 | 12.3 | 603 | 25.1 | 26.2 | 1044 |
| 4. Maharastra | 497.0 | 303.3 | 610 | 439.8 | 249.0 | 566 |
| 5. Haryana | 4.8 | 8.4 | 1750 | 70.0 | 115.0 | 1643 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. Madhya Pradesh | 21.7 | 7.0 | 323 | - | - | - |
| 7. Punjab | 14.0 | 22.5 | 1607 | 85.0 | 132.0 | 1553 |
| All India | 1632.8 | 873.3 | 535 | 2004.2 | 1170.2 | 584 |

**3.6 Area, Production and Yield of Sunflower in Major Countries of the World**

(Area = 1000 ha; Production = 1000 MT; Yield kg/ha)

| Country | | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|
| India | Area | 2093 | 2677 | 2700 | 2158 | 2090 | 2100 | 2200 |
| | Prod. | 1185 | 1396 | 1204 | 1324 | 1217 | 1150 | 1500 |
| | Yld | 566 | 521 | 446 | 614 | 582 | 548 | 682 |
| France | Area | 979 | 786 | 986 | 963 | 891 | 875 | 793 |
| | Prod. | 2116 | 1663 | 2053 | 1987 | 1996 | 1995 | 1736 |
| | Yld | 2161 | 2090 | 2082 | 2063 | 2240 | 2280 | 2189 |
| USA | Area | 827 | 1006 | 1388 | 1363 | 1011 | 1154 | 1407 |
| | Prod. | 1163 | 1167 | 2194 | 1819 | 1627 | 1707 | 2380 |
| | Yld | 1406 | 1160 | 1581 | 1335 | 1609 | 1479 | 1692 |
| China | Area | 807 | 723 | 805 | 813 | 725 | 750 | 780 |
| | Prod. | 1473 | 1282 | 1367 | 1269 | 1290 | 1210 | 1200 |
| | Yld | 1825 | 1773 | 1698 | 1561 | 1779 | 1613 | 1538 |
| Yugoslavia | Area | 194 | 201 | 161 | 169 | 205 | 160 | 160 |
| | Prod. | 359 | 389 | 294 | 295 | 390 | 260 | 325 |
| | Yld | 1851 | 1935 | 1826 | 1746 | 1900 | 1622 | 2031 |
| Australia | Area | 79 | 60 | 113 | 136 | 82 | 139 | 92 |
| | Prod. | 156 | 50 | 105 | 112 | 68 | 143 | 98 |
| | Yld | 1975 | 833 | 929 | 824 | 831 | 1029 | 1065 |
| Russian Fed. | Area | 2889 | 2923 | 3133 | 4127 | 3874 | 3588 | 4166 |
| | Prod. | 3110 | 2765 | 2553 | 4200 | 2765 | 2831 | 3000 |
| | Yld | 1076 | 946 | 815 | 1018 | 714 | 789 | 720 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Asia | Area | 4117 | 4569 | 4678 | 4322 | 4175 | 4009 | 4172 |
| | Prod. | 4015 | 3960 | 3700 | 3963 | 3792 | 3706 | 4037 |
| | Yld | 975 | 884 | 791 | 917 | 908 | 925 | 968 |
| Europe | Area | 9228 | 9696 | 9688 | 10864 | 10768 | 9953 | 11074 |
| | Prod. | 12198 | 11005 | 10775 | 13590 | 12211 | 11638 | 11776 |
| | Yld | 1322 | 1190 | 1112 | 1251 | 1134 | 1169 | 1063 |
| World | Area | 18133 | 18711 | 19178 | 20993 | 20630 | 19493 | 21215 |
| | Prod. | 21716 | 20038 | 21865 | 26366 | 24698 | 23722 | 24942 |
| | Yld | 1198 | 1071 | 1140 | 1256 | 1197 | 1217 | 1174 |

### 3.7 Strengths :

- Sunflower, apart from being a source of edible oil also is a source of lecithin, tocopherols, furfural and nutritious meal used mainly as bird and animal feed.
- The kernel contains 48-53 % of oil and 14-19 % of protein.
- Sunflower oil is considered a premium oil because of its light colour, bland flavour, high smoke point and 40 – 70 % linoleic acid content.
- With the introduction of this crop in early seventies, sunflower growing areas have been considerably increased touching 12 % of the total world's sunflower growing area and production to 6% of that of the world.
- The crop being photo-insensitive and day neutral can be grown throughout the year i.e., kharif, rabi, spring / summer in the alluvial, medium black and deep black soils.
- It is versatile crop and can be fitted well in many of the cropping systems and also as an intercrop.
- Sunflower can be successfully grown as an intercrop with pigeon pea, groundnut, soybean and green gram.
- The sunflower protein contains higher proportions of the essential amino acids.

### 3.8 Weaknesses

- Major biotic stresses of this crop are *Alternaria* leaf spot, downy mildew, root rot, collar rot and head borer.
- Sources of resistance to alternaria are not available.
- The productivity of this crop is almost half (554 kg/ha) of that of the world (1163 kg/ha) as above 70 % of the total sunflower cultivated area is rainfed.

- The lack of sufficient level of autogamy in the cultivated varieties has been one of the prime factors for poor seed set and low yields in India.
- In all the released hybrids, rapid genetic deterioration of both seed and oil yield within 5 years of their release has been noticed.
- Maintenance of genetic purity of the parental lines of the released hybrids is poor.
- The full yield potentials of the released cultivars have not been fully exploited.

## 3.9 Opportunities

- Wild species of *Helianthus* are of potential sources of variability for oil content, oil quality, protein content and resistance to biotic and abiotic stresses.
- For the moisture and nutritional stress areas, composites and synthetic varieties can be developed.
- Cultivars with increased autogamy or self-fertility can be developed.
- There is a greater scope of increasing the productivity with the adoption of improved technology.
- Cultivars with high oleic acid content can be bred as sources are available.
- There is scope for the development of confectionery types of sunflower, which can help the snack industries of our country and also increase the export.
- Sunflower butter, roasted and salted kernels for snack purposes, protein meals and protein concentrates can be prepared.
- Several value added products such as particle board from sunflower stalks, extraction of pectin from thalamus and furfurol from the hull can be manufactured.
- Seed village concept for seed production : One acre of hybrid seed production plot will serve seeds for 40 acres and that of a variety to 160 acres.

## 3.10 Threats

- Increased crop intensity and introduction of exotic material without proper quarantine may result in introducing new diseases and pests.
- Coincidence of flowering period with heavy downpour would result in very low yields due to very poor seed set and high incidence of *Alternaria*.
- Sunflower, unless grown in large areas is likely to be damaged by birds.
- In the absence of strict quality control system, the supply of spurious seeds to the farmers will pose a serious problem.

## 4. CROP SPECIFIC ISSUES

### 4.1 Sunflower

- Development of synthetics and composites.
- Diversification of CMS, restorers and maintainer lines.
- Development of varieties / hybrids with inbuilt resistance to *Alternaria*.
- Evolving confectionery types of varieties / hybrids.
- Integrated nutrient management for sunflower based cropping systems.
- Development of agro techniques for paddy fallows and other non-traditional areas.

### 4.2 Government side

- Twenty percent increase in the existing minimum support price.
- Seasonal variable import duty.
- Regionally differentiated approaches (ie., location specific approaches)

## 5. Future thrust

- Development of high yielding and nutritionally superior hybrids which should have multiple resistance against major pests and diseases.
- Set up of field labs (crop-wise) with modern infrastructure facilities.
- Germplasm collection, wild species collection, maintenance, documentation and protection under WTO's Intellectual Property Rights (IPR).
- Link with major National and International Institutes through Internal / bio-infoservice to update the research activities.
- Preventing Bio-smuggling by monitoring the movement of germplasm from within and outside the country to keep the word bio-safety at DNA level.
- Utilising molecular tools, simulation techniques and genetic signaling to develop time oriented crop Ideotype.
- Capacity Building in Research areas especially in the field of Bio-technology, Molecular genetics and Analytical breeding to equate the modern techniques with developed countries to narrow down the gap between those countries with third world.
- Mechanisation at micro level to make every work more efficient.
- Transferring expertise and capacity building in agri-biotech to meet the commercial requirement and suitable techniques for oilseed crops should be standardised.
- Strengthening skills in innovation management and build research industry interface links to familiarize value added products in oilseed crops.
- Adequate Research Personnel should be engaged in crop-research and after specialization at sector level, they must be allowed to continue in that direction throughout their tenure.

**References :**


1. Agro stat 1994 : Release No. 18 / 94-95, Commissioner of Agriculture, Madras.
2. Annual Report 1998 – 99 : FLD's in oilseeds – DOR – Hyderabad.
3. Damodaram, T. and D.M. Hegde,. 1999 : Oilseeds situation in India : P 1 – 312 DOR Publication, Hyderabad.
4. Damodaram, T. and D.M. Hegde,. 2000 : Oilseeds situation in India : P 1 – 383 DOR Publication, Hyderabad.
5. DOR (1995): Oilseeds Situation in India – A statistical overview P : 1-127. DOR, Publication, Hyderabd.
6. Economic survey 1999 : Economic Survey, Govt. of India 1999.
7. Economic survey 2000 : Economic Survey, Govt. of India 2000.
8. FAO 1998 : Production year book, 1998.
9. FAO 2000 : Production year book 2000.
10. Kannaiyan, S., V. Muralidharan, N. Manivannan, C. Surendran, B. Subbalakshmi and C. Parameswari 2001. Scenario of Oilseeds in Tamilnadu. Problem's and Prospects an overview – TNAU Publication.
11. Muralidharan, V. 1996. Global level achievements in sunflower hybrids and improvement of parental lines. Presented in Training on Hybrid Tech. for Rice, Millets, Pulses, Oilseeds, Cotton and Forage crops (7.2.96 - 28.2.96) at Centre for Advanced Studies for Genetics and Plant Breeding at TNAU, CBE.
12. Muralidharan. V. 1996. Quality of improvement in Castor and Safflower. Presented in Training on Breeding for Quality produce in crops (6.11.96 - 20.11.96) at Centre for Advanced Studies for Plant Breeding (ICAR) at TNAU, CBE.
13. Nair, M.K. and M.K. Rajesh, 2001 : Coconut Production and productivity : Indian. Coconut Journal : June 2001, P 12 – 22.
14. Seetharaman, A. 1982. Breeding strategy for developing high yielding varieties of sunflower. In Research and Development Strategies for Oil Seed Production in India. *Proc. Nat. Symp.* 7-9 Nov. 1979, IARI, New Delhi., 143 – 152.
15. SEA 1996 : Annual Report of Solvent Extraction Association, Mumbai.
16. Souvenir 2000 : XXXVII Cocotech meeting / International Coconut Conference, 2000 CDB – Cochi – India.
17. Perspective Plan 1997 : Vision 2020, DOR, Publication, Hyderabad.