

S U M M A R Y

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Vegetable oils and fats play an important role in the Indian economy, with the current production of about twelve million tonnes, valued at more than 5000 crores of rupees in terms of seed at the present price of about Rs. 500 per quintal.

India does not produce enough oil seeds to meet its domestic requirements; hence large quantities (over a million tonnes) of oils have to be imported every year resulting in a great drain of our foreign exchange (of the order nearly a thousand crores of rupees).

Sunflower (Helianthus annuus L.) is an established oil crop which does not require any discussion to prove its importance, but Niger (Guizotia abyssinica Cass.) an oil bearing crop plant belonging to the same family (Compositae) is a poor relation of sunflower and is not so wellknown or well established. Presently, Niger varieties yield very poorly and are confined to poorest soils where no other crop can be successfully grown.

In the present investigation sunflower has been studied as a summer crop to exploit its potentiality to augment our supply of edible oils and Niger is studied with a view to

assessing its productivity in different seasons and with different agronomic practices adopted to increase its seed-yield or oil-output.

EC 68415 variety of Sunflower and N35 variety of Niger were studied in the present investigation.

The present investigation includes physiological and ecological studies as well as a few agronomic treatments (irrigation and application of Farm Yard Manure (FYM) and chemical fertilizers containing N, P and K).

The data are gathered and processed under the following heads :

Morphological Behaviour

The length of Roots.

The length of Stem.

Root/Shoot Length Ratio.

The number of green leaves per plant.

Average area (cm^2) per leaf.

Total Leaf Area per Plant.

Functional Behaviour

Total Biomass

Root/Shoot Weight Ratio

Chlorophyll content (on fresh weight basis)

Head (inflorescence) diameter (in Sunflower) and
Number (in Niger)

Number of seeds per Head

Weight of seeds per Head

Test Weight of seeds (weight of 1000 seeds)

Seed output

Seed oil content (%)

Harvest Index

Oil Yield

Growth Analysis

Net Assimilation Rate (NAR)

$$\text{mg} \cdot \text{cm}^2 \cdot \text{day}^{-1}$$

Relative Growth Rate (RGR)

$$\text{g} \cdot \text{g}^{-1} \cdot \text{day}^{-1}$$

Leaf Area Index (LAI)

$$\text{Leaf Area (cm}^2\text{) / Ground Area (cm}^2\text{)}$$

Leaf Area Ratio (LAR)

$$\text{cm}^2 \cdot \text{g}^{-1}$$

Sunflower

The crop presented the maximum leaf surface in summer; oil content (%) was highest (about 47%) in monsoon followed by winter (about 44%) and summer (about 38%). Seed yields

were highest (2.4 tonnes/hectare) in monsoon; the winter and summer seed yields were lower (2.14 tonnes/hectare). In terms of oil output the monsoon crop fared still better than in terms of seed yield because of the difference in oil content percentage between seasons. In summer the total biomass production in Sunflower is larger than in monsoon and winter which indicates the need of evolving varieties wherein larger fraction of the biomass is utilized in synthesizing the oil component, rather than utilized in vegetative growth.

Niger

Niger varieties presently grown are poor yielders both in terms of seed yield and oil output. Variety N35 (studied in the present investigation) the highest yield attained (with NPK + FYM) was approx. 300 kg of oil seed/hectare in monsoon which compares very poorly with the lowest yield of Sunflower in this experiment which was about 1400 kg of oil seed/hectare (in control, i.e. without NPK and FYM).

It may be concluded from the results of the investigation that Sunflower can be grown profitably by farmers even as a summer crop, but Niger cannot be a profitably crop unless high-yielding varieties are evolved; until then it can - as it is done at present - be grown on soils good for no other crop.
