PREFACE

From antiquity to the early eighteenth - century, safflower has been an important source for obtaining dyes, a role which has eased with the synthesis of aniline-based dyes.

Pigments from safflower flowers are particularly important because it leaves toxic tailings synthesising colored products in the root of which is during the vegetation migrates through the tissues leading to petals.

Safflower culture being less demanding on the ground and succeeds very well that poorer soils and wetlands, that is not taken into culture and valued as much as a sunflower.

Culture potential of safflower is high, but in our country there is little cultivated land. Lack of documentation on the culture of safflower, and market negăsirea biological material necessary to sow crops that lead to indifference plant growers.

Overall Safflower is cultivated edible oil obtained from achenes with a high potential of unsaturated fatty acids than other vegetable oils, smoke index is very low compared to that of sunflower oil. Safflower oil reduces cholesterol levels and therefore being studied for therapeutic purposes.

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Thank the leadership of Universities of Agricultural Sciences and Veterinary Medicine of Banat Timisoara and Crop Production team discipline, which I have secured the environment for research and gave me their support throughout the period.

The thesis is an extension of 268 pages which includes six chapters with 43 tables, 110 figures and 210 bibliographic references.

ABSTRACT

Safflower has great possibilities of recovery, but unfortunately it is not a highly valued oil plant.

Safflower culture being less demanding on the ground and succeeds very well that poorer soils and wetlands, that is not taken into culture and valued as much as a sunflower.

Culture potential of safflower is high, but in our country there is little cultivated land. Lack of documentation on the culture of safflower, and market negăsirea biological material necessary to sow crops that lead to indifference plant growers.

CHAPTER I
OILSEEDS

Oilseeds (oleifere) are species whose seeds are large amounts of liquid fats, oils, called Current, which is easily extracted by industry. Accumulation of reserve substances in the form of significant amounts of fat may occur in different organs of the plant, in addition to seeds and fruits, it can list the rhizomes, spores, etc. micelinice filaments. (BOAT, 1987 C. Barbu, 1986; BÎLTEANU et al. 1983; BÎLTEANU and colab.1991)

Oilseeds plant group in general are: sunflower, castor, linseed oil, cotton, soybeans, ground nuts, poppy, rapeseed, mustard, camelina, sesame, safflower, sesame, Peril, lalemanţia and others.

Plants that are characterized by high content of vegetable fats are annual, perennial grass and trees and belonging to several botanical families: Compositae (Asteraceae), Cruciferae (brassicas), Linaceae, Euphorbiaceae, Labiatae (Lamiaceae). (Barbu, C, 1986 ; BÎLTEANU and colab.1991).

Classification oilseeds

Plants from which a fall in oil bţine:

1. Plants typical of oil - canola, soybean, sunflower, safflower, linseed oil, castor, olive, camelina, sesame, peanuts earth crambele; peril; lalemanţia.
2. Plants with mixed use:

- Cotton, hemp and flax - grown for the production of fiber to fiber is obtained as a byproduct, oil seeds, this group includes:
- Soy, peanuts - to obtain oil and protein;

- Cereals - corn and sorghum as food and oil which is obtained;
- Pumpkin - to feed the pulp and seeds for oil extraction (V. CAMP 2005)

Other mixed-use plants (phyto other groups) are legumes (soybeans and peanuts), fiber plants (cotton, flax and hemp), aromatic and medicinal plants (poppy, mustard, etc..), Cereals (maize, sorghum), fodder (pumpkin), etc..
Oil accumulates in various parts of plants;

- The tubers in the ground almond;
- The seed, sesame, rapeseed, soybean, castor, poppy, mustard, safflower, corn, sorghum;
- Fruit, the olive and palm.

Formation and accumulation of fat reserves in various plant is a complex process closely linked fitosinteză - the ability to harness energy plant given by sunlight (leaf index), intensity and light frequency.
Plant-oil use
The main uses of vegetable oils, oilseeds produced fully motivate the importance of enjoying the plants in this group. (Muntean, L.S., 1993)
Food vegetable oils (culinary, table, lettuce) have good taste qualities and high digestibility (around 95%), exceeding many animal fats.
One drawback is that vegetable oils in the manufacturing industry lost a lot of fat-soluble vitamins (A, D, E, K).

Vegetable oils are widely used in canning and baking industries. Is obtained by hydrogenation margarine used in food directly or in pastries. Vegetable oils are assessed dietary nutrition, more extensive than last time.
The fact that vegetable fats may play a role in preventing atherosclerosis has been highlighted by many authors over three decades (and colab.2001 BORCEAN) and Terroine, 1963 cited by (A. DUMITRESCU 1986) attributed the lipid content in unsaturated fatty acids (oleic acid, linoleic, linolenic, peanuts) as "essential fat", a term which we know today.
Vegetable oils fluids below 0 ° C (soybean, sunflower, colza, etc..) Can be used as fuel for diesel engines, and after some changes to the way power adjustment. (A. LAZA et al. 1987; E. BOMBARDELLI, 1987)
These changes are eroding or are bypassed when the oil is converted into methyl or ethyl ester, called "biodiesel" or "diester".
After oil extraction, the remaining cakes and cakes are concentrated feed rich in protein (30-50%), extractive neazotate, fats and vitamins. (CV. Anichkov, 1962; CUCU VIORICA, Bode, C., and oilseeds are important agrotechnical terms.
Those that are harvested early (flax oil, cruciferous early), very good run for

winter crops.
Oilseeds hoes, well maintained, contributing to the weed in rotation.
CIONCA, C., 1992).

Oilseeds worldwide situation

Large areas are grown globally with soy, sunflower, groundnuts, cotton and rapeseed. These are the major edible oil producing plants (food), and linseed oil and castor oil industry.
In the last three decades, world production of vegetable oil (edible and industrial) has increased greatly, ranging from about 18 million tons in 1960 to around 58 million tonnes in 1990, maintaining high growth rate and below. (KNOWLES , 1965).
Highest growth rates were achieved in the production of soybean oil, sunflower and rapeseed.
High growth rate of world production of vegetable oils is mainly due to demand for edible oils, industrial maintaining the same level in recent years. Production of animal fats (butter, lard, lard) and oils (fish, whales), registered a lower growth in recent years than edible vegetable oils. In the last three decades, animal fat increased by about one third, and vegetable oils supply about three-fold.
The world production of vegetable oil ranks first soybean (over 15 million tons annually), and sunflower (over 7 million tons), rape (more than 6 million tons), peanuts (over 5 million tons), cotton (about 4 million tons).
Safflower is grown from 1.1 to 1.2 million hectares world.
The largest growing areas in India (about 680,000 ha), Mexico (about 150,000 ha), USA (About 120 000 ha) and Spain (about 70,000 ha).
The area occupied by safflower world is about 1.4 to 1.7 million ha, with an average of 700 kg / ha. (Weiss, 1971).
Other foods are olive oil (more than 2 million tons), sesame (about one million tonnes), safflower (0.5 million tons), maize (0.3 million tons), etc..
The substantial increase in production of edible vegetable oils is due to soybean expansion in the U.S. (used as protein feed) of sunflower in Europe and the U.S. (Due to higher culinary quality of the oil) and rape in the worst conditions (Canada, India). (Weiss, 1983).
It is considered that the annual growth rate of world production of edible vegetable oil is not enough to meet growing demand worldwide.
Oilseeds situation in Romania
In Romania, the following plants are grown for oil oil: sunflower, safflower, linseed oil, castor oil, rapeseed.
It follows that in our country the most important areas with plants owned oil sunflower, rapeseed and soybeans.

In normal years, our country get around 350 - 400 thousand tons of sunflower oil per year and large quantities of soybean oil, corn, etc..
It can thus ensure domestic demand and export any quantities.
The domestic market is required especially sunflower oil.
In 2003 about 5,000 hectares were planted with safflower, and in 2004 over 10,000 ha. Safflower production obtained in our country is superior to sunflower production in areas with less fertile soils and moisture deficit.
You could say the same about the safflower oil iodine value 140-152 and contains 21% oleic acid, linoleic acid 73% and 3% fatty acids (BÎLTEANU, GH., 2001).
The oil is similar in taste and culoarecu sunflower oil and food uses predominantly with low smoke index.
In our country, a culture of safflower can be particularly important in arid areas, land with low fertility, which ensures comparable production yields of sunflower.

CHAPTER II
Safflower oil plants

Archaeological excavations in Egypt have shown that safflower was cultivated in ancient times, probably before 1600 BC (ZAMFIRESCU, N. and colab.1958, scale, F.1965).
Fase in which mummies were wrapped in ancient Egypt were painted extracted from crocus flowers. (Weiss 1971).
From antiquity to the early eighteenth - century, safflower has been an important source for obtaining dyes, a role which has eased with the synthesis of aniline-based dyes (Brătulescu, C. 1988).
The XV-XX centuries safflower was considered by Arabs as a plant with diaphoretic properties (Chavane 1961).
Safflower was known in antiquity as oil plants.
In a papyrus of Ptolemy II - the years 259-258 BC, it was stated inter alia that the king had complete monopoly over the cultivation and marketing of oil plants, and among them were included, castor, safflower, sesame and flax oil. (WEISS, A. E. 1971).
Discord Greek physician in his work (De Materia Medica) and safflower oil which included him as a mild laxative herbs among the 600 (WEISS 1983).
Discord also noted that safflower flowers are used to dye some drinks and ointments, and young parts of the plant were eaten fresh.

The use of safflower as a medicinal plant was mentioned by many authors, among them was Paul Argineta (615-690), who taught and practiced medicine in Alexandria. Between X-XV centuries, crocus was considered by Arabs as a diaphoretic herb properties and was used for this purpose by them (Brătulescu, C., 1988).
In Iran and Afghanistan, was an ideal source of safflower dyes, the famous carpets and rugs.
In India, the beginning of fosr used as safflower oil plants (JUKOVSKI, PM 1950).
Also in ancient safflower was cultivated in Pakistan, China and Japan (NAAZAR, A.1985., Y-Jue, LI et al. 1981, 1986 and Weiss, EA 1971).
In Europe, it is the first work that safflower is attributed to Albert Magnus in the thirteenth century (HANELT, P. et al., 1985). It was first cultivated as an ornamental plant and for medicinal purposes and then obtaining dyes (Brătulescu, C., 1988).
In Europe, culture was introduced in the middle of the eighteenth - century (HANELT, 1963).
In Mexico and the U.S. as in other Latin American countries, safflower crop was introduced by Spanish and Portuguese immigrants, began being cultivated as an ornamental plant and later as a tinctorial plant KNOWLES, PF (1955), and Purdy, R. H et al . (1959), quoted Brătulescu, C. (1988).
In our country, Major, G. 1985 indicates that safflower is grown for its flowers that get two colors, a red "steadfast" and a yellow "volatile."
PRODAN, I. (1939), describes the plant and its uses mentioned.
Romanov, A. (1942) describes as safflower oil plants.

Importance and uses
Growing Safflower oil is currently used in the preparation of margarine, salad. And together with sesame oil and peanut butter is used to obtain a high quality crop.
Following genetic progress and improving safflower, oil content increased from 25-35%, as record forms are grown in the period 1950-1960, at 40-45% for varieties grown at present, making the content fruit oil sunflower (KNOWLES, PF 1969, 1983, 1985, HELM, JL et al. 1985 WICHMAN, DW 1987, CORLETO, A. et al. 1987 Brătulescu, C 1988).
Due to the high content in unsaturated fatty acids of safflower oil in food use does not result in increasing the amount of cholesterol in the blood. It eliminates the danger of coronary arterial disease (Beech, DF1960, singing, F. 1965, Hoag, BK, et al. 1969, Constantine, L. 1983).

Safflower oil is characterized by high content of linoleic acid (76.4%), iodine value with a limit of between 140-152% 186-193% saponification index, acid value from 0.3 to 3% and a linoleic acid decreased from 0.1 to 0.3%.
Minchev, IA (1952) shows that although sicativitatea safflower oil is two times lower than that of flax, it can be used for preparing cooking oil, the linoleumurilor and waxed paper.
RHEINECK, AE (1966) highlights the fact that safflower oil may be used to obtain high quality films for the film, while retaining the transparency of time and not scratching.
KNOWLES, PF (1967) mentions folsirea safflower oil in varnishes and paints industry, as shown and Beech, DF (1969), does not oxidize.
CHRISTMAS, F. (1971) mentions that safflower oil is widely used in pharmaceutical industry, detention and antirheumatic cathartic effect. Crocus flowers have soothing qualities of cough.
Crocus flower and currently receive food and industrial dyes. It is important to note that the pigments produced from safflower leaves tailings in the products we stained.
Carthamina is one of the most valuable non-toxic compounds used in food industry or textile industry.
Along with the crocus flowers also contain izocarthamină, carthamidina, izocarthamidina and various water-soluble yellow dye KNOWLES, PF (1955) and WEISS, EA (1971).
Carthamina is in flower at a rate of 0.3-0.6%, and the colors "yellow soluble in water" at a rate of 20-30%.
In some parts of the world, the younger of the safflower plant are eaten fresh as salad.
In terms of agricultural crop safflower are important for many countries, two aspects in particular are attractive:
- Safflower oil is the only unpretentious culture of potassium fertilizers to small claims and phosphorus fertilizers;
- Safflower plant is a good pre-winter cereals (KNOWLES, PF 1965, 1980, JACKSON, JF 1985, QUILANATAN, VL et al. 1985; Sawant, AR 1985, NAAZAR, A. 1985, Mundel, H. 1987; CORLETO , A. 1987; and WICHMAN, DV 1987).
The oil is yellowish-white and used as such for preparing salads or cooking. It has a very low smoke index from sunflower oil. (V., Camp, 2005)
The iodine value of this oil is between 140-150. (Gh, BÎLTEANU, 2001)
Safflower oil is used to make candles parfurmate, margarine manufacture, chemical industry as feedstock for the manufacture of paints.

Fruits (achenes) - and hidrogog have purgative properties and is used in medicine. Seeds are used to treat tumors, especially those located in the liver. Chinese medicine in treating dysmenorrhea seed recommended for women with

cancer at an astringent effect. (H, LI DAJUE, H. Mundell 1996)
The seed still get a quality meal with a high protein content. Has the purpose flour feed but can also be included in baking recipes for human nutrition.
Flowers - contain substances antitussive properties, entering into the composition of tea. Flowers are considered as having laxative properties, sedative and is used to treat scarlet fever.
The petals - containing approx. 20% and 0.5% yellow pigment red pigment. These pigments can be used to obtain the use of natural dyes: food, textiles, pharmaceuticals, cosmetics industry.
Pigments from safflower flowers are particularly important because it leaves toxic tailings colored products.
Pigments which is synthesized in roots during the vegetation migrates through the tissues leading to petals. (V., Camp, 2005)
Disc red national flag of Japan has color-IRO beni (deep red) which is traditionally extracted from the petals of beni-ban (Carthamus tinctorius). (Www.inaro.de)
Usher in 1977 mentions safflower grown for ornamental purposes.
In Europe it is used for fresh cut flowers and dried flowers, used in haberdashery. The Netherlands is one of the promoters of this new use. In the U.S. studies are yet to find valuable genotypes in terms of floral aspect, studies have been conducted since 1999 by WESTERN REGIONAL PLANT INTRODUCTION SATION (WRPIS). Since market research is conducted.

Origin and spread
Safflower, the oil plant, is known since antiquity. It is located in the crops in the U.S., Israel, Morocco, Spain, Italy, France, Pakistan, Tunisia, India, Australia. (BÎLTEANU, GH. 1998)
The surface world is busy with safflower 1.4 to 1700000 ha. with an average production of 700 kg / ha. (V. CAMP. 2005)
Safflower ensure good results in areas with fertile land and sufficient moisture. It is an oil plant with real prospects for expansion in culture in the south, west and east of the country. (V. CAMP. 2005)
Morphological and biological characterization
Safflower is an annual oleifera plant, planted grass and spontaneous.
Root - Swivel, penetrates the soil up to 2 - 2.5 m deep, heavily branched with good capacity for solubilisation and absorption of nutrients.
The stem height of 50-100 cm, is glossy when ripe glabrata silvery-white with purple hues branched in the upper half as corymb.
On mature plants, the main root can penetrate the soil to a depth of 2-3 m, with numerous secondary roots spread sideways. Because the root system, safflower oil is very resistant to drought, it can be grown safely in areas where irrigation is difficult to introduce.
Leaves are alternate, long 5-10 cm wide approx. 3 cm, sessile amplexicaule the

lower and the middle and upper.
They are shiny cropped with toothed edges, with or without thorns thorns on the side.
Flowers - are small, hollow formed by type 5. The flowers are grouped into smaller and smaller heads, with a diameter of 1.5 - 3.5 cm. Dialing in a capitulum 15-20 achenes. On a plant can form 14-60 of heads, and a capitulum of flowers are 25-60. Corolla consists of five petals yellow to deep red color, surrounded by five sepals characteristic of safflower, 6-7 mm long.
The fruit is an oblong pyriform achenes equipped with four pearly white edges. (S., NITA. G., POP and colab.2001).
In many cases safflower seeds are provided with a membrane composed of narrow Papus from becoming persistent sepals.
Systematics, species
Safflower is part of the family Compositae (Asteraceae), Carthamus genus comprising several species:
- Carthamus lanatus L.
- Carthamus oxyachantha L
- Carthamus tinctorius L.
Varieties are grown as part of the species Carthamus tinctorius L.
In our country growing local population. In Iasi, BRĂTULEANU C. (1988) obtained several important lines in their capacity of over 1000 kg oil / ha (over 35q/ha achenes, more than 1260 kg / ha oil).
Safflower - chemical composition
In addition to fatty acid content of 32-40% safflower seeds also contain a protein percentage of 11-17% and 4-7% water. The chemical analysis were obtained seeds 100g: 482 calories, 4.8 g water, 12.6 g protein, 27.8 g fat, 50.5 g lucid, 25.1 g carbohydrates, 4.3 g ash, 126 mg.Ca. ; 310 mg.P., 9.7 mg. Fe., 0.59 mg. Thiamin, 0.14 mg. riboflavin, 0.5 mg. niacin.
(L., Vick, Bradley, et al. 1999)
Oil content of fatty acids: 1.5% mirstic acid, 3% palmitic acid, stearic acid 1%, 0.5% arachidric acid, 33% oleic acid, linoleic acid 61%.

CHAPTER III
THE NATURAL PROCESS

Description of the natural environment in Timisoara

Assessment of climatic conditions have been performed for the perimeter Teaching Experimental Station, University of Agricultural Sciences and Veterinary Medicine of Banat Timisoara located in the Plain - Plain subunit Crisan Banato interfluve Timis Bega - Beregsau.
Climatic conditions

Criptovegetaţie During the last five years have been the lowest temperature recorded in February, when the monthly average is well below the annual average. Desprimăvărarea in 2005 and 2006 there has been much delayed. In March the average temperature was at half the average temperature a few exceptions in recent years multianuală.Cu temperatures are higher than the annual average.

Reference area is the interference with the maritime character of air masses, the origin of the western and eastern continental origin, is periodically reviewed in the territory affected by the presence of masses of warm air from southern origin.

Overall, the greatest influence on the area, have a maritime air masses, the western origin, with a high moisture content, followed by the subtropical and continental Eastern origin. The two last mentioned categories are usually generators of drought that adversely affect agricultural production in the reference area.

Studying climate type map of the territory of Romania, shows that the reference is within the continental temperate climate moderated, located at the junction zone sector in terms of ocean climate has interferences at the provincial climate with Mediterranean influences.

Temperature. Temperature conditions of the years 2005-2007

Temperature is a factor directly influencing vegetation growth and plant development.

Multi-zone air temperature is 10.8 0C reference to the growing trend in recent years.

The average winter isotherm is between 0 and-10C, and annual average temperature of the coldest month, January, is between -1 and -2 0C.

Absolute minimum temperature has values between -20 and -30 0C, and the lowest value of -35.3 0 C, was recorded in Timisoara in 1963.

Mean global thermal resources T> 00C range between 3800 0C and 4100 0C. They allow the cultivation area of plants to high temperature requirements.

To characterize the climate of the year 2005 compared with the experimental multi-media have used the data recorded at the Meteorological Station Timisoara.

In 2005, recorded temperatures during the growing season with few exceptions (August) average annual temperatures are higher. This does not affect plant growth and development of safflower. In terms of temperatures recorded in 2005 but the first part (March) offers very favorable conditions for the culture of

safflower.
In 2006 recorded temperatures are more favorable Timisoara safflower cultivation, than in the previous year they looked like and could be carried out in March when monthly average temperature of 500C to 10C less than the annual average.
During the growing season except during the months of May, June and August, average monthly temperatures are lower or almost equal to the annual average.
Overall average monthly temperatures recorded in the vegetation period of safflower in 2006, favorable plant growth and development.
In terms of heat in 2007 is warmer than the early years of the experimental cycle.
The warmest months of the growing season are 4.60 C March, April, 3.60 C, in May, 6.6 0C, June 5.50 C and 0.90 C in July. These temperatures did not affect the phases of vegetation development of safflower plants. Monthly average temperatures below those of the average annual recorded in August and September of 2007 does not affect in any way safflower plant evolution, which is reached maturity stage.

Humidity

The average annual precipitation is 631.0 mm Timisoara area.
Soil receiving the highest amounts of precipitation during spring, early summer and lowest in winter.
Frequency for long periods of dry years is 20-30% and those with 11-12% excess rainfall.
Balance is the annual hydroclimatic subexcedentar, low deficit, a hydroclimatic index of 90.5 and an index of aridity "The Martonne" 30.5.
The annual average potential evapotranspiration is 698 mm. Water balance of climate conditions, without any groundwater, removing long-term record a surplus of moisture in winter - spring and a lack of moisture during the summer months - early autumn.
Value index of dryness "The Martonne" Long-Term 30.5 Timisoara area showing the location of the interference with the semi-humid steppe steppe wet.
To characterize the climate of the 2005-2007 cycle have used experimental data recorded at the Meteorological Station Timisoara.
It follows that in all experimental years were favorable conditions for emergence.
In spring and summer temperatures in 2005 were favorable plant growth.
In 2005 înregisrate precipitation will vary from month to month. Thus in

February, March and April precipitation will be above average multi fallen in the area. Excess rainfall in March and especially the fact that they fell short every time they made the first sowing safflower very difficult to achieve.
In 2006, rainfall is more balanced than in 2005.
This year the annual average surplus achieved in February, March, April, June and August. Shortage of rainfall compared to annual average are recorded in May, July, September and October.
Analysis of climatic data in Timisoara in 2005 and 2006 except for February and March of 2005 when rainfall was delayed due to sowing safflower. Actually climate data shows a favorable report temperature and rainfall safflower plants.
In terms of 2007 rainfall regime is characterized by normal monthly precipitation when compared with those of multi-media. The analysis of precipitation fallen in 2007 we find that the amount of precipitation in February and March (average annual high) premise creates a pool of water in the soil sufficient to safflower plants that can carry out in good condition early stages growing (germination, emergence, leaf and stem formation system). In May and June when the quantities are below the annual average precipitation.
Precipitation deficit in May and June the water supply in view gained ground in February, March and April provide water regulation during growth of strains, safflower plants even if the quantities of precipitation in the two months are below multi-media. In relation to the first two years of 2007 after the experimental cycle of precipitation amount is characterized as a dry year.

Soil Characterization

Description of soil type

Experience has been placed in EDS areal Timisoara part of the great physical and geographical unit: Field-Cri Banato (Berindei, Nedelcu, 1893), the main form of relief Plain Beregsau Bega-Timis interfluve in connection with the high plain of Banat (Mihailescu, 1967).
The main feature of this area is a flat, slightly wavy.
The experimental field was located on a chernozem soil type cambic wet (gleyed weak) decarbonated weak, loess, clay argilo-prăfos/luto-argilos.
Depth of groundwater lies at a depth of 2-3 m.

CHAPTER IV

RESEARCH OBJECTIVES, MATERIAL AND METHOD

Research Objectives

The research in the field and laboratory, was intended to achieve the following objectives:

- Establishing the production potential of new lines of safflower oil extracted

from a local population of Timisoara planted many years in the field of Crop Production Course
- The timing of sowing of safflower having regard to the period of vegetation and areas of application
- The ability to produce oil lines studied under the influence of sowing time
- Safflower plant growth and development in relation to technological and climatic factors
- Determine the main elements of plant productivity
safflower in terms of Timisoara.
The material used in research
To achieve the research objectives were used 12 lines of safflower obtained by individual selection from a population of Timisoara preserved in teaching the discipline of Plant growing field.
In addition to determining the production capacity and oil content were determined in the laboratory for biometric measurements:
- Length of the stem
- Total branches (branching grade) to determine: - the main branches (those placed directly on the main stem) and secondary branches (those located on the main branches)
- Number calatidiilor
- Diameter calatidiilor
- The number of achenes per plant
- Weight of achenes per plant
Except when sowing to set up exploratory factor
Safflower cultivation technology was applied to the specific culture of this plant in large reference area.
Safflower plant pre-culture in the three experimental years was winter wheat.
Fertilization culture was complex fertilizers N15P15K15 type in the amount of 450 kg / ha complex which was equivalent to 70 kg / ha nitrogen, phosphorus and potassium.
Basic plowing to 20-22 cm depth was performed. Seedbed was processed and standardized with combinatorial and the work was done by entering in the winter.
In the spring two or three days before sowing, seedbed preparation was done with combinatorial which was meant to break the crust of the east and destroy weeds and loosen soil to a depth of seeding.

Over the period of vegetation patches were made by thinning the density of all the work being done when the plants reached the 2-5 leaf stage.

Research method

To emphasize the productive capacity of new lines of safflower (Carthamus tinctorius L.) under study, has organized a two-way experience the experimental factors in the three years taken in the study were:

To learn about the years 2005-2007:

Factor - planting dates

- Age and March
- APRIL II era
- MIA Third Age

Factor B - safflower lines

- Population Timisoara - T 33
- 5 T - T 36
- T 6 - T 40 low waist,
- T9 T 41
- T 10 - T 100
- T 27 - T 40 high waist,

Field placement experience was after block method with plots randomized.

Experimental variants were placed in three repetitions with randomization factor B (safflower lines).

Production results were calculated and interpreted by means of variance analysis and biometrics were calculated and interpreted by the method of variation string.

CHAPTER V
RESULTS OBTAINED
Production results
Summary of safflower production in the seeding in March and April in years
2005 - 2007

Yields from safflower are strongly influenced by the conditions of experimental, and less time to line sowing safflower (Table 5.22)..

Analyzing the results of the experimental cycle 2005 - 2007 for the two planting times (March, April) there is some very important elements for safflower

cultivation technology for production of achenes.
The results show that the production of safflower achenes is strongly influenced by climatic conditions, average yields due to this crocus are different from one year to another, that explains the different level of production of the three experimental years. If we take 2005 as the basis for a finding that the conditions of 2006 meeii safflower production is 926 kg / ha which represents only 81% of its production in 2005, 223kg/ha gap year to give basic production is statistically assured as significant. In 2007 the average yield is 1377 kg / ha realizing an increased production of 228 kg / ha which is provided as statistically significant.
Regarding the time of sowing is found that late sowing in April determines the realization of a production of only 31% of the average obtained in March.

5.1.5. Summary of the sowing of safflower production in the three sowing periods in years 2006 - 2007

Table 5.23. production is presented synthesis results obtained from safflower oil under the influence of sowing time in terms of 2006 and 2007 since the year 2005 due to climate conditions have not been able to achieve only two planting dates in March that April. The three times of sowing in March, April and May could be achieved only in 2006 and 2007.
The analysis results are found in safflower production is strongly influenced by climatic conditions of each individual year. Thus in 2006 the average three times the production is performed sowing of 719 kg / ha. Compared to 2006 the average production in 2007 is 1039 kg / ha. Average yield increase from the year 2006 is 45% and an increase of 320 kg / ha as very significant statistically.
Taking the analysis of three planting dates of sowing safflower note that the delay depends on climatic conditions of each year. Thus sowing in April leads to a production of achenes which represents only 35% of production by sowing safflower in March.
Delay sowing until May lead to a drastic decrease in production of achenes. By sowing safflower in May, safflower lines carry an average of two years only 20% of its production at the optimal sowing period. It is noted that very large differences in production of 1103 kg / ha and 1354 kg / ha compared to the production obtained by sowing in March that are statistically very significant.
Summary of production results highlight the fact that safflower could be delayed sowing the plant floor coverings and this might be green throughout the year for green manure crop, but also to obtain pigment either directly from the stems either chopped flowers that can be obtained if plants reach flowering.
Analysis and synthesis of achenes productions made by the 11 lines of safflower planted in three eras in terms of 2006 and 2007 show a production potential

good enough if we consider that on average yields are achieved by sowing introduced in late April even when making only 35% or 20% of the production obtained from seeding in March.
Average yields achenes of the 11 safflower lines range 772kg/ha line T40 and 979 kg / ha in line T33. The population of Timisoara is obtained an average of 862 kg / ha. In relation to the production of witness (Timisoara population) of the 11 lines of safflower oil, production is made equal to eight (T100) or above those of the witness T5 - 2%, T10 - 3%, T27 - 10%, T33 - 14% , T36 - 12%, low waist T40 - T41 1% - 2%. Production increases achieved with one exception statistically line T33 are uninsured. The T33 line growth compared with the output produced is 117kg/ha Timisoara Population and ensured that significant statistically. In other lines of production increases and differences relative to production are not statistically witness, they are found only within experimental error.

5.4. Summary of the safflower oil production in the experimental cycle 2005 - 2007

5.4.1. Summary of the safflower oil production during 2005 - 2007

Since the cycle of three years of experiments, only two times of sowing in April and May were made throughout the experimental cycle 2005 - 2007, and May sowing was not possible due to bad weather conditions only in 2006 - 2007. Synthesis of oil production in the experimental cycle 2005 - 2006 are presented in Table 5.37.
The analysis results shows that safflower react strongly that the climatic conditions of the growing year. So in 2005 we achieved an average production of the two times of sowing of 327 kg / ha. In 2006 oil production mediede two times of sowing is only 265kg/ha, 62kg/ha difference to oil production in the first year being statistically significant.
In 2007 the average yield of 397 kg / ha of oil is 21% higher than that obtained in the first year of the cycle experimentally produced increase of 70 kg / ha as distinct statistically significant.

Regarding the time of sowing is found that late sowing in cultivated safflower oil leads to major reductions in oil production.
Regarding the average realized oil from the 11 new lines of safflower and Timisoara population taken as evidence that the witness potential of the studied cultivars is affected by the production in April of the two experimental years. Oil production achieved in 11 lines of the test is superior Population Timisoara. By analyzing the three-year oil production obtained from seeding in two periods: April, May to conclude that the most valuable line T10 with an average oil production of 464 kg / ha.

CHAPTER VI
Biometric measurements
Summary of average values of the main characters and elements of productivity in terms of years safflower Timisoara 2005 - 2007

Taking into account that in 2005 the experimental cycle due to climatic conditions have made only two planting dates, the summary results of the experimental cycle was made both for the two times of sowing in the three years of experience and those three planting dates in two years of experimental cycle from 2006 to 2007.

6.4.1. Summary of average values of the characters in safflower sown in March in 2005-2007

Three-year average values of the main characters include safflower planted in March is represented in Figure 6.90. Analyzing the results it is found that the average length of safflower plants even when it is sown in optimal time, varies from year to year depending on climatic conditions of the year. Of the three experimental years the highest average values of stem length is achieved in 2005 (range 94.2 cm to 114.75 cm line to line T9 and T10). In 2007, recorded the lowest average values of stem length from safflower (range 73.30 to 84.1 population of Timisoara and the line T5). On average over three years to sowing in March, the length of the 12 strains of safflower various studies, ranges from 76.63 cm to 97.85 cm line to line T27 and T10.

Figure 6.91. are the mean total number of branches on safflower plants from crops sown in March of the years 2005-2007 in terms of Timisoara. Graphic analysis shows that the average number of branches per plant varies greatly limits being 12.4 and 16.1 branch line branch line T5 T9.

The average number of main branches safflower plant (Figure 6.92.) Is a large variation (between 6.3 and 9.4 branches to line T10 main branches of plants liniaT9 average). Analysis of the results plotted show that the four strains of the 11 entered the study the average number of main branches per plant is less than that achieved in the population of Timisoara (7.53 branch). These lines are T5 - 7.33 branches, T6 - 7.03 branches, T10 - T40 class 6.3 and lower main branches - the main branch 7.36.

The average number of secondary branches per plant obtained by sowing safflower in March in 2005-2007 is illustrated in Figure 6.93.

The analysis finds that the average values for most lines studied, the number of secondary branches is lower than the population of Timisoara 6.95 secondary branches.

Figure 6.94. graphic is shown the average values of the number of safflower

plants calatidii on the sowing period in March 2005, if the average number of calatidii 2007.În per plant at five of the lines, it is lower than that achieved by the population of Timisoara calatidii 13.06. The largest number per plant is obtained calatidii T10 lines - 15.8 and T9 - calatidii 14.5 per plant.
Calatidiului average diameter obtained in 2005-2007 from the safflower plants sown in March and the conditions in Timisoara is illustrated in Figure 6.95. The population of Timisoara, the average diameter of calatidiului safflower plants from crops sown in March is 1.67 inches.
Which shows that this character has a high degree of stability regardless of climatic conditions in which they grow.
The average weight of achenes per plant obtained in 2005-2007 by safflower planted in March is illustrated in Figure 6.96. Analyzing the results reveals a large variation of this highly important for productivity in safflower. Compared to the population of Timisoara only two lines achenes per plant weight is greater than that done to them - 12.69 g. Are the lines T10 and T40 with 13.38 g 13.06 g per plant. Of the 11 lines studied five achenes per plant weight is less than 10 g.
The analysis highlights during experimental cycle that achenes weight variation from one year to another on the same line is small with few exceptions.
Line T10 - with 9.64 g in 2006 and 15.47 in 2005, T33 in 2005 to 9.83 g and 11.83 g in 2006, low waist T40 - 9.68 in 2005 and 10.8 g in 2006 and 2007, T41 - to 7.78 in 2005 and 9.88 g in 2006 and T100 of 9.7 g in 2005 and 12.73 in 2006. If weight is achenes per plant compared notes with a particular line T10 averaged over three years achieved an average weight of achenes per plant 13.3 g.

The average number of achenes per plant obtained from safflower sown in March in the year 2005-2007 in terms of Timisoara is illustrated in Figure 6.97. The analysis shows that the mean number of achenes per plant has a high variability both from one line to another line, and from one year to another.
6.4.2. Summary of average values of quantitative characters of safflower planted in April in the period 2005 - 2007

Figure 6.98. are the average values of strains derived from safflower crops sown in April in 2005-2007. Analyzing the results reveals a greater variation of this character. The population of Timisoara stem length three-year average is 66.9 cm. In comparison, all lines studied have greater stem length. Between the lines of strain variation in the average length varies between 69.7 cm and 76.5 cm line T5 T36 line. It is important to note that the average length of stems in safflower is strongly influenced by environmental conditions of experimental years. The population of Timisoara is the average length of 45.8 cm in 2005 and 83 cm in 2006. Regarding the influence on the length of the experimental strains in comdiţiile years shows that the least favorable to growth in stem length is

2005, and are the most favorable conditions of 2006 (variation between 74.1 cm and 85.8% lines T41 line T5).

The degree of branching (total branches per plant) is shown in Figure 6.99. The total number of branches per plant is correlated with safflower production capacity of each plant. Compared to the population of Timisoara to average total number of branches is 12.9, the average length of five lines is less strain, T5 - 12.3 ramifications, T9 - 12.7 ramifications, T41 - 12.5 ramifications, T100 - 11.8 ramifications and T40 - 12.8 ramifications. Line with the largest size is T36 with an average of 16 branches per plant.

Figure 6100. are the mean number of main branches on the tree obtained peritada 2005-2007 safflower crops sown in April. Of the 11 safflower lines 3 to 1 in the number of legs that carried the main population of Timisoara - 7.9 main branches.
Figure 6101. are the mean number of secondary branches from plants of safflower crops sown in April in the years 2005-2007 in Timisoara. The graphic analysis shows that the number of secondary branches is high variability so whichever (variety, line) and especially the specific climatic conditions of each crop year.

The average number per plant safflower calatidii from cultures obtained by seeding in April from 2005-2007, is illustrated in Figure 6102. The plot shows that the number of calatidii the plant has a high variability of biological material used as time and specific climatic conditions of cultivation.
Compared to the population of Timisoara all 11 new lines of safflower have an average number per plant calatidii higher. The highest values of average number per plant are calatidii lines T36 - 13.9 calatidii, T33 - 12.5 calatidii and T10 - 12 calatidii.

Figure 6103. Mean values are represented calatidiilor safflower diameter obtained in 2005-2007. Obtained and plotted mean values shows that all lines of research introduced sown in April, are higher than those made to the control population of Timisoara - 1.39 cm.

The average weight of the safflower achenes sown in April in the years 2005-2007 is shown in Figure 6104. By analyzing the values plotted there is a large variation in their genotype and both under the influence of specific climatic conditions of experiment. The population of Timisoara average weight of achenes in the three experimental years is 3.04 g. In comparison with the population of Timisoara, all 11 lines of safflower achenes weighing it on the tree top.
The vast majority of lines studied, the average weight of achenes per plant is

less influenced by environmental conditions.

The average number of achenes per plant crocus is an important element of productivity in this species. The average number of achenes per plant built during 2005-2007 is shown in Figure 6105.
Analysis of results and plotted data show that this quantity is influenced mainly by genotype and less environmental conditions specific to each year of the experimental cycle.
In comparison with the average number of achenes achieved at sowing safflower in March at sowing in April, the number of achenes per plant is lower in all lines. It is essential to know the safflower growers. Late sowing reduces the number of achenes per plant safflower.
6.4.3. Summary of biometric measurements of quantitative characters in safflower planted in May 2006-2007

Only two of the three years (2006-2007) could be sowing in May. And safflower plants from crops sown in May of 2006-2007, measurements were made on: stem length, degree of branching, the number of calatidii, calatidiilor diameter, seed weight and seed number per plant.
The average length of stems is shown in Figure 6106. Analysis results show that the delay in sowing safflower primarily affecting plant height, lower than safflower plants from crops sown in April. Reducing plant height by late sowing is mainly due to lack of optimal conditions for the completion of phenophase during periods of vegetation.
Compared to the population of Timisoara from which these lengths are most affected in growth and development when seeding is delayed until May.

The degree of branching of safflower plants is also affected by delayed sowing in May 6107 figure.
Average total number of branches on the tree planting safflower in May range from 9.3 branch lines T6 and T40. The largest number of total branches in safflower sown in May to get the lines T5 - 12.2 ramifications, T9 - legs and T100 11.9 - 11.5 total ramifications.
The average number of main branches per plant are shown in Figure 6108. Analysis of the number of main branches per plant, shows a high variability. The population of Timisoara is achieved an average number of main branches per plant of 6.8 branches. Below the average number of main branches made the population of Timisoara is a single line T6 - 5.8 main branches.

The average number of secondary branches per plant in Timisoara population and 11 lines derived from it, is shown in Figure 6109. The analysis of average values shows that the number of side branches arising from the safflower plant crops sown in May of 2006-2007, has a very high variability. The average

number of secondary branches on the safflower plant population of Timisoara is the 4.2 branch. Average value of secondary branches per plant in version control at the new lines studied, the average number of secondary branches per plant secondary branches varies between 2.6 and 5.2 branch line T40 T5 line. of the 11 lines studied, eight of them, the number of secondary branches safflower plant is lower than that achieved by the population of Timisoara.
The average number of calatidii on safflower plants from crops sown in May in the years 2006-2007 is accounted for Timişoasra population and the 11 new lines in Figure şofănel 6110. Calatidii average number per plant ranges from 8.65 to 11.05 in line line T40 and T5. The population of Timisoara calatidii average number is 9.7.
Over 10 calatidii per plant lines is conducted at T5 - 11.05 calatidii, T9 - 11 calatidii, low waist T40 - T100 with 10.21 and 10.34 per plant calatidii.
There is great influence of climatic conditions on the number of calatidii per plant varies from one version to another. Thus the population of Timisoara in 2006 is done on average per plant - 10.3 calatidii, and in 2007 only 9.1 calatidii. The T36 line in 2006 to obtain calatidii 8.4 per plant, and in 2007 to 11.27 calatidii. There are lines that climatic conditions in the two years that have calculated the average number of calatidii, they do not change too much T10 - 8.8 calatidii in 2006 and 9.8 in 2007. The T100 line is obtained in 2006 and 10.6 calatidii calatidii 10.09 in 2007. The same lines are found and T40 - 8.5 and 9.1 in 2006 calatidii calatidii in 2007, T33 - 9.3 and 9.1 in 2006 calatidii calatidii in 2007 T6 - 9.1 calatidiii in calatidii 2006 and 8.6 per plant in 2007.
Average diameter calatidiilor the safflower plants from crops sown in May 6111 is represented in Fig. The plot reveals a small variation of this character. It is noted that the lowest average diameter of safflower calatidiilor population of Timisoara is obtained at an average of 1.52 cm. In comparison, all the 11 lines studied calatidiilor average diameter is greater than that registered population of Timisoara. The largest diameter calatidiului safflower sown in May in the years 2006-2007 is made in lines T27, T40 low waist, T41 and T100 - 1.8 cm.
The average weight of achenes is shown in Figure 6112. The analysis of the mean size of the weight of achenes is highlighted that the 11 lines studied four below the average weight of achenes made public at the Timisoara (5.97 g). The highest values of average weight of achenes, is done on lines T27 - 7.7 g, low waist T40 - 7.5 g, T9 - T33 6.4 g - 6.3 g.

Changes in the average number of achenes on safflower plants is shown in Figure 6113. The average number of ahene the safflower plant are a variety of achenes per plant line 56.1 T6 95.4 achenes per plant and the T27 line.
Of the 11 lines studied, only five the number of achenes per plant is higher than the population of Timisoara who achieve 88.5 achenes per plant.
Comparing the mean number of achenes per plant depending on climatic conditions there is a wide range depending on the number of achenes planted

line.

CONCLUSIONS

Timisoara conditions are favorable for growing safflower.
Decade of sowing without significant differences in safflower production.

By analyzing the synthesis results obtained in 2005-2007 included the bilateral table shows that safflower sowing time plays an important role in shaping production. Virtually no cost-effective production can be achieved if not observed when seeding.

With the years 2005-2007, production is best achieved by sowing safflower in March with a production of 1665 kg / ha, compared to the yields obtained by sowing in April 519 kg / ha.
In 2005, with yield in selected lines of the population of Timisoara - 1149kg/ha are superiore productions in 2006 - 926 kg / ha, but lower yields achenes produced in 2007 - 1377kg/ha.

Safflower yields achieved in 2006-2007 shows that safflower achenes productions can only meet the conditions of sowing time.

With the years 2005-2007, the best production of safflower oil is achieved by sowing in March with a production of 509kg/ha, compared to the yields obtained by sowing in April 144 kg / ha with a difference of 365 kg.

Conţinuitul productions of oil and safflower achenes made in 2005-2007 show that safflower oil production can be achieved only if they respect the time of sowing.