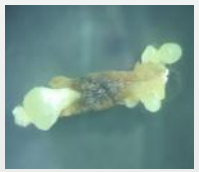
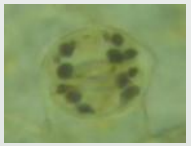
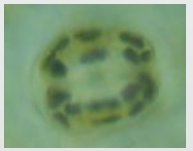
Areas of work of the Institute of Oilseeds of the NAAS and proposals for cooperation

BIOTECHNOLOGIES TO ACCELERATE OILSEED BREEDING

Obtaining dihaploid rapeseed and flax plants through anther culture

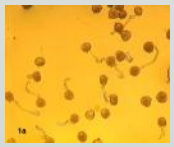
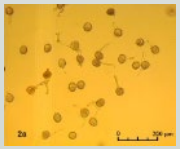


Prediction and identification of plant ploidy in in vitro culture

Induction of genetic changes in *in vitro* culture of sunflower embryos and flax callus cells

Assessment of pollen viability of different flax species on artificial nutrient medium

Obtaining salt-tolerant genotypes in flax callus cell culture

Proposals for cooperation: Induction of genetic changes in in vitro culture of oilseeds Culture of oilseed embryos to accelerate breeding

Breeding and genetics (*Nigella damascena L.*)

Using induced mutagenesis to expand genetic variability

Scientia Horticulturae

Multiple actions of genes affecting flower shape in *Nigella damascena* L.

Viktor Lyakh, Anatoliy Soroka

New forms

shs1 gene

shs2 gene

Proposals for cooperation:
- Genetics of qualitative and quantitative traits
- Obtaining new germplasm

Variety
ZAPORIZKA ZORYA

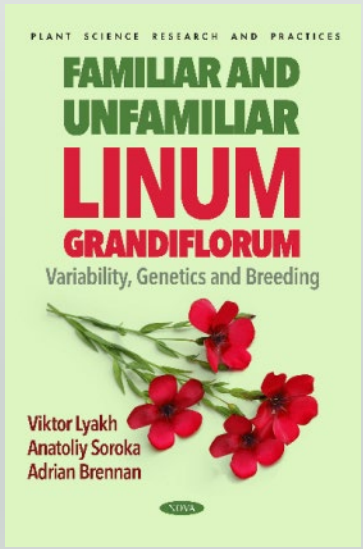
- Plant height – 42-50 cm.
- Potential yield – 0.5-0.7 t/ha.
- Weight of 1000 seeds – 2.3-2.5 g.
- Oil content in seeds – up to 40%.
- Essential oil content in seeds – up to 3%.

shs1 *shs2*

shs1 *shs2* source sample

Breeding and genetics of *Linum grandiflorum* Desf.

The use of chemical mutagenesis to expand genetic variability. Obtaining varieties by direct selection of mutants



Three-locus flower color control

Phenotype F_1	Number of plants F_2	Фенотипи нащадків F_2					χ^2
		crimson	red	apricot	pink	light apricot	
Expected split							
crimson	64	27	9	12	12	4	
The observed cleavage							
crimson	47	19	7	7	10	4	0,88

Proposals for cooperation

- Genetics of ornamental traits
- Obtaining new genetic changes

Variability of flower shape

FLAX BREEDING AND GENETICS USING WILD SPECIES

Correlations of habit traits with the number of capsules on a plant

Trait	Crossbreeding combination	Number of stems on a plant	Number of lateral shoots on a plant
Number of pods per plant	M 32/2 / *L angustifolium*	0,68*±0,06	0,84*±0,04
	M 32/2 / *L. hispanicum*	0,67*±0,06	0,89*±0,04

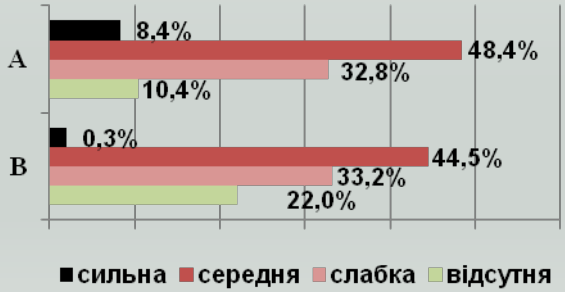
Inheritance of plant habit traits in F_1

Crossbreeding combination	Number of stems on a plant		Number of lateral shoots on a plant	
	hp	Ht, %	hp	Ht, %
M 32/2 / *L. angustifolium*	0,27	-27,53	3,28	**43,79**
M 32/2 / *L. hispanicum*	2,08	**35,77**	3,19	**34,74**

Selection of specimens with altered plant habit and distinctive morphological characteristics of the flower and seeds

Manifestation and inheritance of capsule dehiscence

Degree of dehiscence of the boxes: *L. usitatissimum, L. angustifolium , L. crepitans*



A – F_2 *L. crepitans* × M 32/2
B – F_2 M 32/2 × *L. angustifolium*

Proposals for cooperation:

Formation of resistance to abiotic factors and productivity of cultivated flax using traits of wild species

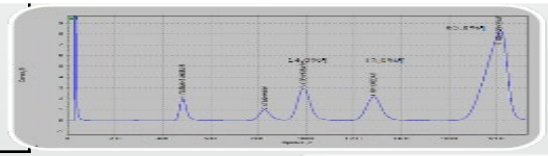
BREEDING AND GENETICS OF OILSEED FLAX (*Linum usitatissimum L.*)

Methods of creating source material:
- intraspecific and interspecific hybridization
- induced mutagenesis; - microgametophyte selection; - anther culture

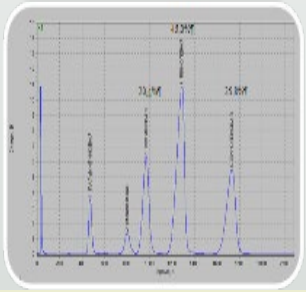
мутація форми квітки

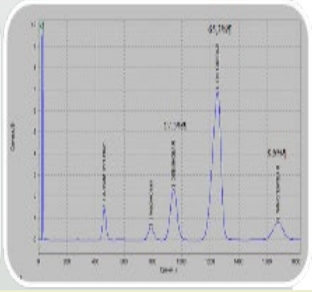
мутація - хлорофільна недостатність

Creation of technical flax varieties:
Zolotysty, Vodogray, Svitlozir, Zaporizhzhya Bogatyr, Patricy
(linolenic acid content more than 60%)



Creation of food flax varieties:
Zhyvynka, Linsan, Pozhyvny, Victoria
(reduced content of linolenic acid and increased content of the complex of linoleic and oleic acids)





Zhivinka – the first variety of food use in Ukraine

Fatty acids	%
linolenic	25,9
linoleic	43,6
oleic	20,6

Proposals for cooperation:
Genetics, physiology, biochemistry of cold resistance, frost resistance and heat resistance of oilseed flax

Breeding for large seeds combined with high oil content
Zaporizhzhya Bogatyr - a variety of technical use

Weight of 1000 pcs., g	Oil content, %
9,0	49-50

Selection and genetics of winter flax:
6 winter-hardy samples were identified: the Sideral variety (France), two samples obtained from a complex cross between the Sideral variety and domestic varieties, one mutant sample of IOC selection

Collection of cultivated flax and mutant collection with morphological marker traits

Collection of wild annual homostyle species

Collection of wild perennial species

Winter rapeseed breeding *(Brassica napus L. oleifera)*

Proposals for cooperation:

Creation of high-yielding and high-oil varieties of parental lines and hybrids of winter rapeseed: resistant to diseases; different maturity groups, with a low content of glucosinolates

Increasing winter and frost resistance.

Mustard breeding (*Sinapis alba L., Brassica juncea L. Czern)*

1. Study of the features of inheritance of economically valuable and morpho-physiological traits of mustard.
2. Creation of mustard varieties: with increased oil content in seeds: for spring varieties up to 44-45%, for winter varieties - 47-50%; allyl mustard oil - up to 1% and improved fatty acid composition - erucic acid not more than 5%; with distinctive morphological features (color of flowers, seeds, plants, shape of leaf blade).

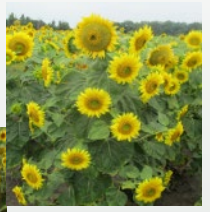
Proposals for cooperation:
Genetics, physiology, cold resistance, frost resistance, creation of mustard-rapeseed hybrids, various mustards

Results of variety testing of winter mustard-rape hybrids in 2018-2019.

Trait	Yield, t/ha	Oil content,%	Essential oil content, %	Erucic acid content, %	Weight of 1000 seeds, g	duration of the growing season, days	Level of winter hardiness, %
ГРГ-51	**2,2**	**44,12**	**0,22**	**0,13**	**3,3**	**273**	**98,9**
ГРГ-46	**2,6**	**45,85**	**0,22**	**-**	**4,2**	**275**	**98,1**
ГРГ-47	**2,5**	**46,60**	**0,33**	**0,16**	**4,0**	**273**	**97,9**
ГРГ-52	**1,8**	**45,21**	**0,42**	**0,04**	**3,1**	**273**	**97,4**
ГРГ-5	**2,2**	**45,16**	**0,19**	**0,12**	**3,4**	**270**	**97,1**
Novinka, st	1,7	38,96	0,79	32,7	2,4	**280**	81,2

Селекція, генетика і насінництво соняшника *Helianthus annuus L.*

Genotypic features of valuable economic traits in sunflower lines and hybrids under climate transformation conditions

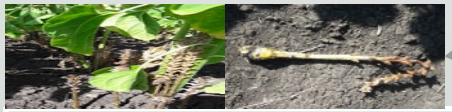


Creation of fundamentally new sunflower hybrids adapted to environmental conditions

Breeding lines for drought resistance, heat resistance, stability, plasticity

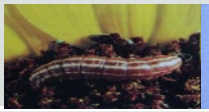
Breeding for high yield, oil content, 1000-seed weight, and oil yield

selection of linear material, on an infectious artificial stationary background, most adapted to abiotic and biotic environmental factors



for resistance to Orobanche cumana

for resistance to major phytopathogens



For resistance to insect pests

Hybrid name	Yield, t/ha			
	2021	2022	2023	average
Первісток	4,00	2,21	4,15	3,45
Приз	3,95	3,03	4,32	3,77
Агент	2,88	2,30	4,40	3,19
Божедар	2,98	2,24	4,01	3,08
Маршал	3,49	2,41	4,19	3,36
Тур	3,95	2,66	4,01	3,54
НСР $_{0,05}$	0,18	0,21	0,33	

Proposal for cooperation: Selection of sunflower samples based on drought tolerance, adaptability, resistance to major diseases, pests, and scab.

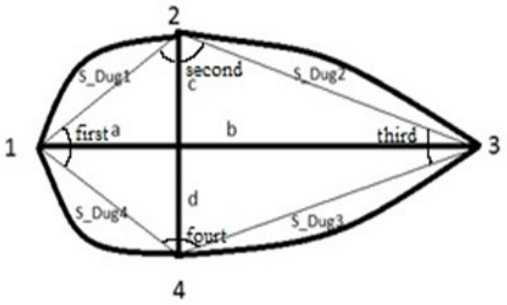
Genetic, trait-based sunflower collections *Helianthus annuus L.*

- Sunflower genetic collection by morphological marker traits 71 samples. Sv.vo No. 43 dated 11/15/2007
- Genetic collection of lines of analogues by morphological traits, 43 samples No. 217 dated 12/31/2015
- Characteristic collection by seed size 43 samples No. 222 dated 12/31/2015
- Genetic collection by branching trait 41 samples. 6 genes.
- Genetic collection by types of marginal flower color and types of sunflower seed color. Includes 42 samples In total, 3 layers and 10 alleles of 4 genes for seed color and 5 genes for flower color are described..
- Educational collection of annual sunflower by main areas of use 27 samples No. 351 dated 10/29/2025.

Seed ovule	Epidemic	Armoredness	Hypodermis	Anthocyanin
Present alleles	Ew>Estr>Edg	P>p	Hyp>hyp>hyp_{yw}	T_1 >t
Phenotypic manifestation	White > striped > gray	Presence > absence	White > gray > yellow	Available > absent

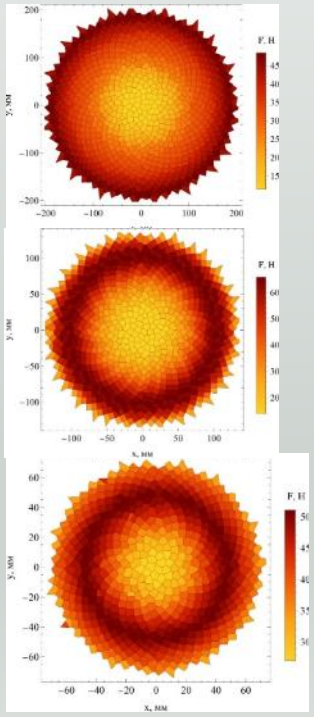
Sunflower phenotyping

Determining the shape and size of seeds

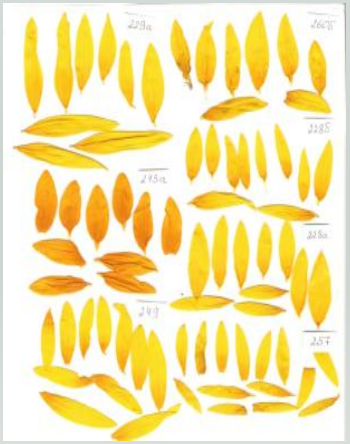


Proposals for cooperation: studying genetics, creating breeding forms and selections using our own methods and devices for phenotyping sunflower and other oilseed crops

Determination of the breaking strength of sunflower seed husks



Determining the shape and color of a leaf or marginal flowers of a sunflower



Breeding, creation of collections, including genetic collections of various oilseed crops

The oilseed collection of the Oilseed Institute contains 1,890 samples, including sunflower - 714, castor oil - 306, soybean - 295, flax - 196, mustard - 104, sesame - 126, safflower - 62, peanut - 22, and other rare crops - 65

The basic collection of castor oil plant
Ricinus communis L., which consists of 208 samples originating from 34 countries. The collection is described by 24 characteristics, which have 103 levels of their manifestation.

УКРАЇНА

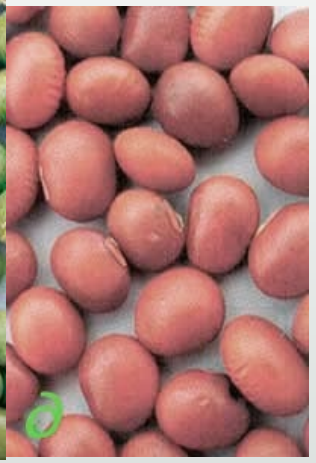
СВІДОЦТВО

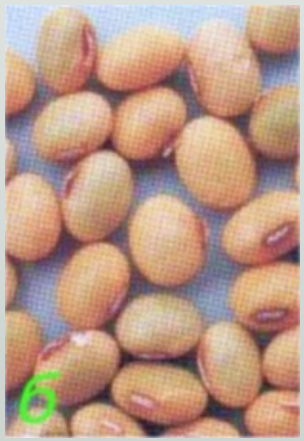
про реєстрацію колекції генофонду рослин в Україні

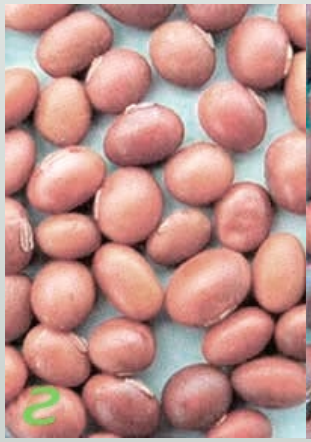
№ 291

GLYCINE MAX (L.) MERRILL

Working characteristic collection of cultivated soybean for the steppe zone of Ukraine. The collection includes 134 samples from 11 countries, the collection is described by 32 characteristics and 106 levels of their manifestation.







УКРАЇНА

СВІДОЦТВО

про реєстрацію колекції генофонду рослин в Україні

№ 322

a – yellow (Yug-30);

b – yellow-green (Vinny);

c – green (Georgina);

d – light brown (2947 564/84);

d – brown (DSS 2504);

e – dark brown (2974 IS-24)

СВІДОЦТВО

№ 230252

про авторство на сорт рослини

SESAME *Sesamum indicum L.*

- The basic collection of sesame samples of the Institute of Oilseed Crops includes 120 samples from 15 countries of the world, 7 certificates of the National Center for Plant Breeding and Breeding have been obtained.
- 6 sesame varieties have been created and entered into the register of plant varieties of Ukraine: Nadiya, Boyarin, Kadet, Ilona, Boyarin, Astor

Proposals for cooperation:
Genetics, physiology, breeding, replenishment of sesame collections

SAFFLOWER *Carthamus tinctorius L.*

МІНІСТЕРСТВО АГРАРНОЇ ПОЛІТИКИ УКРАЇНИ
ДЕРЖАВНА СЛУЖБА З ОХОРОНИ ПРАВ НА СОРТИ РОСЛИН

ПАТЕНТ

№ 110325
НА СОРТ РОСЛИН

Латинський назва сорту
Сафлор красильний
Carthamus tinctorius L.
ботанічний таксон

Дата пріоритету: 05.11.2009
Дата державної реєстрації майнових прав інтелектуальної власності на сорт рослин: 15.03.2013
Володілець(льці):
Інститут олійних культур Української академії аграрних наук
Товариство з обмеженою відповідальністю Науково-виробнича фірма "Дріада, Лтд"

Голова Державної служби з охорони прав на сорти рослин С.І. Мельник

МІНІСТЕРСТВО АГРАРНОЇ ПОЛІТИКИ ТА ПРОДОВОЛЬСТВА УКРАЇНИ

СВІДОЦТВО

№ 160532
ПРО АВТОРСТВО НА СОРТ РОСЛИН
Добриня
назва сорту
Сафлор красильний
Carthamus tinctorius L.
ботанічний таксон

Заявка № 13172001
Автор(и):
Деус Тетяна Вікторівна
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Директор Департаменту землеробства та технічної політики в АПК В. Тончій

The following varieties were created and entered into the Register of Plant Varieties of Ukraine: Sonyachny, Zhivchyk, Lahidny, Dobrynya.

Two safflower collections were registered: selection and characteristic for valuable morphological traits

Inheritance of morphological traits was established.

A method of crossing safflower was developed and patented, patents were obtained for the method of selection by the sixth leaf and determination of the huskiness of safflower seeds.

Proposal for cooperation: Selection of safflower samples by characteristics, creation of varieties and collections, study of the genetics of characteristics.

Camelina sativa L.

The following varieties were cr
Prestige, Stepovy 1, Zeus,
Mirage, Slavutych,

Proposal for cooperation for all small collections: exchange of collection material, joint study, development of methods and creation of new varieties.

Arachis hypogaea.

The collection includes 18 samples

Lallemantia iberica (M. BIEB.) Fisch. & C.A.Mey.
Lallemantia canescens (L.) Fisch. & C.A.Mey.
Lallemantia royleana (Benth.) Benth.
Lallemantia peltata (L.) Fisch. & C.A.Mey.

Proposal for cooperation for all small collections: exchange of collection material, joint study, development of methods and creation of new varieties.

Eruca sativa

Euphorbia lathyris

Perilla nankinensis (Lour.) Decne
Perilla frutescens (L.) Britt

Cyperus esculentus L.

SMALL COLLECTIONS OF OIL PAINTINGS

APPEARANCE OF THE INFLORESCENCE: (FROM LEFT TO RIGHT) AMARANTHUS DEFLEXUS L. UDS00096, AMARANTHUS PANICULATUS L. UDS00097, AMARANTHUS ALBUS C. UDS00133.

Proposal for cooperation for all small collections: exchange of collection material, joint study, development of methods and creation of new varieties.

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- https://imk.zp.ua/
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  - Scientific Profile of the Journal: Agricultural and Veterinary Sciences
  - (Cluster Name): (H1 Agronomy, H7 Agroengineering)
  - Publisher ROR: 05tm1p212
  - Media identifier: R30-07237