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# **INNOVATIVE DEVELOPMENT OF SCIENCE AND EDUCATION**



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# **INNOVATIVE DEVELOPMENT OF SCIENCE AND EDUCATION**

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# AGRICULTURAL SCIENCES

## ORIGIN, INTRODUCTION AND PHASES OF CRAMBE ABYSSINICA HOCHST. UNDER THE CONDITIONS OF THE RIGHT-BANK FOREST- STEPPE OF UKRAINE

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**Introduction.** For the first time, Abyssinian mustard, also known as crambe, was breeding in the Mediterranean countries, Ethiopia, Uganda and Kenya. Since 1958, the plant has been actively cultivated for commercial purposes in North Dakota [2, 4].

This plant was testing in crops by Professor V. F. Vasiliev in the Voronezh region in 1932 in the fields of the Botanical Station named after Academician B. A. Keller. Crambe seeds were obtaining, by scientific exchange, from the Algerian Botanical Garden, where they were collected from wild plants of this species in their homeland - in Abyssinia. Until now, crambe has not been tested anywhere in the culture; experiments in the USSR are the first, they marked the beginning of the

introduction of this plant into the culture and served as a basis for its testing in a number of countries [3].

Since 1939, the botanical station began to distribute crambe seeds for testing in various regions and republics of the Soviet Union. Crambe seeds were sending to 64 points in the USSR, including the Republic of Belarus. In 1939, the total sown area of crambe was 20 hectares. Positive results of experiments with the new crop were noted at all sites and its wide study of agrotechnics in production conditions was planned [8, 10].

In 1940, the network of geographical research and production crops crambe significantly expanded. Trial crops were carrying out in Voronezh, Kursk, Sverdlovsk, Tambov, Ivanovo and other regions, as well as in Ukraine, in the Chuvash and Bashkir Autonomous Soviet Socialist Republic. The total area of crops occupied by the new crop was 310 hectares. In all areas, crambe has proven to be a high-yielding and high-oil crop [1, 8, and 12].

In the spring of 1941, 600 hectares have already been sow, including about 300 hectares in the Far East, 100 in the Byelorussian SSR, and 50 in the Chuvash Autonomous Soviet Socialist Republic. However, the war suspended its further implementation, crops almost all died, and seeds were lost during the war (Kuchеров E.V., 1971).

Research work on crambe during the war years was carrying out only in Bashkortostan under the leadership of Eugene V. Kuchеров, who made a huge contribution to the study of this culture, where the seeds are preserved. Small Bashkir parties since 1951, Abyssinian crambe has been included in planned crops in some regions of the Soviet Union. In 1951, more than 600 hectares were sowing, and in 1952, crambe research and production crops in the USSR occupied more than 1,000 hectares. In the period from 1950 to 1960, Abyssinian crambe was growing on not a few hundred or even thousands of hectares, after which it disappeared from crops for a long time (Breeding Report 1952) [3, 7, and 10].

Experiments on the introduction of Abyssinian crambe, conducted in the 1930s and 1940s in the USSR, were the first, and they marked the beginning of the

introduction of this plant into the culture and served as the basis for its testing in a number of countries (Kuchеров, E. V., 1976; Grubben G. J., 1978).

In the United States, the plant was imported in the 1940s to an experimental agricultural base in Connecticut and then in the 50's began to be widely cultivated. Crambe is successfully growing in various parts of the United States, but commercial cultivation is concentrated in North Dakota.

In addition, crambe is studied and grown in many countries around the world - Sweden, Poland, Germany, Bulgaria, Ireland, Canada, Denmark, Japan, China and others. (Carlson K.D. et al, 1985; Panno G., 2009; Paulose B. et al, 2010; Toebe M. et al, 2012; Santos R.F. et al, 2012) [2].

The development of annual seed plants goes through certain stages - stages. Stages are those qualitatively new turning points in the development of plants without which further normal development is impossible.

According to our long-term observations, the Abyssinian crambe plants have the following main phases of growth and development: germination, rosette formation, stalking, budding, flowering and full ripening (Table 1).

*Table 1*

***Phases of growth and development of Crambe abyssinica Hochst.***

<i>№</i>	<i>Phases</i>	<i>Morphological features</i>	<i>Duration of the growing season, days</i>
1.	Seedlings	Above the surface of the soil are cotyledons. The first, second and third true leaves appear	6-12
2.	Formation of the socket	The socket is forming; the fourth-twelfth leaves appear.	10-13
3.	Stems	The height of plants increases to 25 cm, branching begins.	15-20
4.	Budding	Buds appear, the lower buds of the inflorescence increase in size.	25-35
5.	Flowering	Beginning of flowering: the first flowers appear on the central brush. Full bloom: flowers appear on the side branches.	15-20

6.	Maturation	The pouring of seeds and formation of pods on a plant comes to the end. The fruits acquire a straw-yellow color, and the seeds in them - the inherent color of the variety	25-35
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The duration of the phases is different and depends on meteorological conditions. There are no sharp boundaries between these phases, and the transition of the plant from one phase to another is gradual.

The speed and timing of phenological phases is an important indicator of the extent to which the crambe plant is providing with the necessary conditions for its growth and development [11, 12].

Under favorable conditions, friendly seedlings usually appear 7-9 days after sowing. The growth of the first pair of true leaves begins on the third or fourth day. With the advent of seedlings growth and development of cramps occurs with varying intensity. In the first growing season, it grows slowly. During this period, a strong root system and rosette of leaves are forming. Starting from the stalk phase, there is an intensive increase in vegetative mass. In the stalk phase, the height of plants increases to 25 cm, branching begins. The duration of this period is about 15-20 days.

During the period of stalking - the beginning of budding, depending on the provision of moisture and heat, the development and growth of *crambe abyssinica* is faster. The fastest growth of the crop in height begins during budding. During this period, the buds appear, they gradually increase in size [4, 9].

The period from budding to flowering is 25-35 days. Flowering cramps occurs 45-55 days after emergence and lasts 15-20 days. It occurs in several stages: the beginning of flowering, full flowering and the end of flowering (5% of buds did not bloom).

*Crambe abyssinica* ripening begins in the second decade of July, ends in the first and second decade of August, and lasts 25-35 days. Maturation is defining by the completion of seed formation and rapid leaf fall [10].



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Depending on the variety and region of cultivation, the duration of growth and development of Abyssinian crambe is on average 90 - 102 days.

Thus, high seed yield, relatively short growing season, which allows to cultivate this crop almost everywhere, its resistance to abiotic and biotic environmental factors, high content of oil and erucic acid in it allow to include *crambe abyssinica* among the promising crops for many uses.

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