



## ONTOGENESIS IN GROWTH AND DEVELOPMENT OF INDIGOFERA PLANT

G. Q. Yakubov

Candidate of Agricultural Sciences, Urganch State University, Docent

S. M. Mambetullaeva

Karakalpak Institute of Natural Sciences, Doctor of Biological Sciences, Professor

M. Sh. Nurullaeva,

Urganch State University, Doctor of Philosophy (PhD) in Agricultural Sciences

### Annattosia

This article discusses the ontogenesis periods of *Indigofera tinctoria* plant cultivation, growth and development in different soil and climate conditions in Khorezm and Tashkent regions.

**Keywords.** *Indigofera*, growth, development, latent, virginal, juvenile, immature, vegetation, soil.

### INTRODUCTION

Great attention is being paid to the study of promising plants for the national economy of our republic, their involvement in production, acclimatization, cultivation and reproduction in different regions. The plant *Indigofera tinctoria*, famous for its indigo dye for several centuries, is one of the dye-giving plants, and the study of its bioecological properties is one of the urgent problems [1]. Humanity has an increasing need for natural products in comparison to artificial products. Natural dyes are environmentally friendly products, and fabrics dyed with them do not lose their color and quality even after several years and under the influence of various environmental factors. [9].

*Indigofera tinctoria*, a plant belonging to the *Fabaceae* family, acclimatizes to our climate, increases the productivity of degraded soils, obtains natural Indigo dye pigment from its stems and leaves, and scientifically substantiates aspects of its use in handicrafts and the pharmaceutical industry. Methods and bioecological characteristics of *Indigofera* plant cultivation in degraded soils of Khorezm region were studied.

### Research Methods

In the study of bioecological features of plants in ontogeny, T.A. Rabotnov [8], I.G. According to Serebryakov's method [6] and to determine the germination of seeds in laboratory conditions, 100 seeds of plants were placed on printed paper moistened with purified water in a Petri dish and grown at room temperature. In order to determine the germination of seeds in





field conditions and the viability of seedlings, 100 pieces of plant seeds were sown in rows to a depth of 1-2 cm on the basis of 4-fold replication in spring (end of April). To get accurate results, they were monitored every 5 days from the appearance of the first sprout until the sprouts were well behaved. Experiments to determine the sowing rate of seeds were planted based on the method of sowing 15-20 seeds per 1p/m. In order to determine the effect of sowing time on fertility, seeds were sown in late April and early May. Field experiments were conducted in conditions of meadow alluvial soils of Khorezm region and gray soils of Tashkent region.

### Research Results

I.V. in the study of the seasonal development pattern of the plant, that is, ecological and phenological observations and phenological spectra. Borisova [3] and I.N. Beideman [4] methods were used. During the growing season, the formation of grass, the appearance of true leaves, the formation of branches and the growth of stems, budding, the beginning of flowering, the completion of flowering, seed setting, seed germination, and the duration of vegetation were studied. Morphological parameters at different stages were carried out on model plants in the experimental field, where the results were obtained based on the average value of the data obtained from 10 plants. Productivity of the plant was determined by multiplying the average weight mass of the plants in the calculation area of 1m<sup>2</sup> by hectare based on 4 returns. Ontogeny is a certain way of achieving growth and development through interrelated quantitative and qualitative changes that cover all the morphological, physiological and functional processes that occur during the individual development of an organism, which is an individual development from the process of fertilization of an egg cell to the natural death of an organism. includes the process.

In our research, the growth and development of the Indigofera plant in the soil and climate conditions of Khorezm and Tashkent regions, the features of adaptation to different ecological environments were studied and some indicators were comparatively analyzed.

### Latent Period

Seed fertility is one of the main indicators that determine the reproduction and recovery of a plant from seeds, the fate of a species and the quality of seeds (Ivanova, 1985; Terekhin [7] Seed fertility in different plants and various factors affecting it U. Heideker, N.A. Askochenskaya , M.G. Nikolaeva (1982), M.G. Nikolaeva and others, J.D. Bewley, M. Brack [2], G.T. Djamalova, A. Seitkarimov [5] have been studied in depth.

In the case of the Indigofera plant, the plant is in the primary dormancy, i.e., in seed form. One pod of Indigofera is 0.8-1.0 cm long, and each pod contains an average of 3-4 seeds.





Ripe pods have a brown color, and the seeds are small green, light brown, and the average weight of 1000 seeds is 10.0-12.0 g. Germination and ripening of seeds differ based on ecological and geographical criteria, direct influence of abiotic factors, and determine quantitative quality indicators of seeds. *Indigofera* plant seeds were germinated in a Petri dish at temperatures of +20, +25, +30, +35 0C in laboratory conditions for 18 days at a temperature of +20 0C, and the germination rate was  $32.0 \pm 0.30\%$ , at a temperature of +25 0C in 14 days  $48.0 \pm 0.42\%$  germinated,  $72.0 \pm 0.68\%$  in 10 days at +30 0C,  $87.0 \pm 0.90\%$  in 10 days at +35 0C.

**Virginal period. Grass stage.** In the life of *Indigofera tinctoria*, the virginal period is divided into 4 stages: grass, juvenile, immature, and adult virginal stages. Traditional plants growing in our republic are often planted in early spring and autumn (October, November). And since *Crotalaria alata* is a heat-loving plant, its seeds are sown in late April and early May as a main crop and as a repeat crop after winter wheat. After sowing, the seeds germinate fully after 3-5 days. The average air temperature during this period is 18-25<sup>0</sup> C. After 5 days of germination, the leaves are green. *Indigofera* produces 2 small leaves and a young root. In this period, the main root of the plant is 2-3 times longer than the above-ground part of the plant, and lateral roots begin to form. At the grass stage, the length of the cotyledon was 0.5-0.8 cm, and the width was 0.5-0.6 cm. The length of the root is 1.5-2 cm, there are 1-2 lateral roots, its length reaches 0.3-0.5 cm. The grass stage lasts 8-10 days.

**In the juvenile stage (j)** the development of the main stem and roots of *Indigofera tinctoria* was observed at the end of May. The height of the plant is 3-4 cm, the cotyledon leaves have grown to 2-3 x 0.5-0.7 cm, and from this time, the first and second cotyledon leaves begin to form. The first true leaf band is short, the length of the leaf plate is 1.0-1.5 cm, and the width is 1.0-1.3 cm. The leaves are located alternately on the stem, the shape consists of semi-oval simple and compound leaves. Normal leaves are produced in the early to mid growing season of the plant, but are shed towards the end of the growing season. The compound leaves are oddly feather-like, and the ones in the lower part of the stem consist of 3-5 petals, and the middle ones have 5-7 petals. The length of the main root is 2.5-3.0 cm, and the length of the side root is 0.5-0.8 cm. The juvenile stage lasted 15-20 days.

**Immature stage (im).** In the immature stage, mainly in the beginning of June, the shoots are fully formed, almost mature plants appear, and at this stage, the size of the leaves gradually increases, the leaf plate expands, and the root grows. At this stage, 3-5 leaves are formed on the shoot.





After the plant leaves its leaves, the plant continues to produce flowers until the end of the growing season, with the formation of simple and complex leaves. The immature stage lasts almost a month in the plant. At this stage, the root length of the plant has reached 10-20 cm. At this stage, the signs typical of the juvenile period disappear in the plants, but 8-12 lateral branches of the first order appear in an incomplete state, their length is 15-25 cm. Immature plants, unlike juvenile plants, developed lateral branches, in which up to 6-7 leaves were formed. The leaves are located alternately on the stem, the shape consists of semi-oval simple and compound leaves. Normal leaves are formed at the beginning and in the middle of the plant's growth period. The root is an arrowroot, brown in color, and it goes 30-40 cm underground.

**Adult virginal stage** - fell on *July*. At this stage, depending on the temperature, the leaves of *Indigofera tinctoria* are fully formed and the length of the stem reaches 80-110 cm. Compound leaves are dark feathery, leaf plates are ovate, oval green in color. In the adult virginal stage, the lateral branches of *Indigofera tinctoria* are formed mainly from the lower part of the plant and reach an average of 5-10. By this time, the plant will grow rapidly, equal to the height of the main stem or even taller. Small branches develop from the side branches of the plant, and leaves form from the small branches. The leaves on the small branches are twice as small as the leaves on the main and side branches. It was found that the growth and development of the plants at this stage during the vegetation period and the biomass increased. At this stage, the length of the leaf plate is 2.0-2.5 cm, the width is 1.0-1.5 cm, the length of the leaf band is 4-6 cm, the length of the smallest leaf plate is 1.0-1.5 cm, the width is 1, 5-2.0 cm, the length of the leaf band is 1.0-1.5 cm. it is noted that During this period, the stage of formation of inflorescences and formation of buds began, and pods began to form. In the first decade of September, the pods began to ripen one after another, and the full ripening period of the seeds lasts until the third decade of September. During the seasonal development, the height of the plant reaches 80-120 cm.

### Conclusion

It became known that the growth and development of the *Indigofera* plant is directly dependent on the environmental conditions. When the *Indigofera* plant is grown for seed production, the vegetation period is 150-160 days, when it is planted in the decade of the end of April, and 100-120 days when it is grown as a repeat crop from winter wheat. To obtain dye from the *Indigofera* plant, the dye can be obtained after the plant has entered the flowering phase.





## References

1. Anitha R., Murugan A., Gnanendra S. Anti-Psoriatic Activity of *Indigofera tinctoria* Leaves Extract on Staphylococcus Aureus Embedded Hacat Cells: A Systematic Approach // Journal of University of Shanghai for Science and Technology. - 2020.- Vol. 22. -P. 738-745
2. Askochenskaya N.A. Water regime of seeds // Seed physiology. -M.: Nauka, 1982. -S. 223-274.
3. Borisova I.V. Seasonal dynamics of the plant community // Field Geobotany. - Leningrad: Nauka, 1972. T. 4. - S. 5-94.
4. Beideman I.N. Methodology for studying the phenology of plants and plant communities. - Novosibirsk: Nauka, 1974. - 154 p.
5. Jamalova G.T., Seitkarimov A. Peculiarities of seed germination of astragalus in the desert zone of South Kazakhstan // Vest.selhoz nauki, 2005. -№2. -WITH. 17-
6. Serebryakov I.G. On the method of studying the rhythm of the seasonal development of plants in geobotanical stations // Reports on meetings on stationary geobotanical research. – M.-L.: Ed. Academy of Sciences of the USSR, 1954. -S. 145-159.
7. Terekhin E.S. Seed and seed reproduction. –SPb. Peace and family, 1996. -376s
8. Rabotnov T.A. Life cycle of perennial herbaceous plants in meadow cenoses / Geob. Tr.BIN ANSSSR. Series 3, 1950. Issue. 6. -S. 7-204.
9. Ergashev A.E., Eshchanov R.A., Rakhimov A., Yakubov G.K. Cultivation of the Indigo plant, natural dye biotechnology and improvement of degraded lands. Educational and practical manual for farmers. Tashkent - 2012.

