Special Issue on Application of Science for Sustainable Development to Overcome Covid-19 Pandemic
Published by Novateur Publication India's
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN: 2581-4230, Website: journalnx.com, 22th Aug. 2020

REPRODUCTIVE BIOLOGY OF L. MELIA GENUS SPECIES IN THE CONDITIONS OF SOUTH UZBEKISTAN

Bobir Baysunov,
[1]Karshi State University. Uzbekistan, 180100, Kuchabag, 17.

Lutfullo Yoziev,
[1]Karshi State University. Uzbekistan, 180100, Kuchabag, 17.
e-mail: yozitv_50@mail.ru

Shavkat Ubaydullaev
Karshi branch of the Tashkent Institute of Irrigation and Agriculture Mechanizations Engineers. Uzbekistan, 180119, Karshi, Khanabadskoye shosse, 19.
e-mail: shavkat_57@mail.ru

Abstract
The aim of the research is a comparative study of the processes of formation of generative structures, flowering, pollination and seed formation in introduced species of the genus MeliaL. in the south of Uzbekistan. The highest coefficient of seed productivity is observed in 5-8-year-old trees - up to 17.1-18.6% in M.azedarachL. and up to 12.6-12.7% in M.toosendanSiebetZucc. With increasing age of plants, this indicator decreases. These are representatives of the genus MeliaL. has a high adaptive potential to the extra-arid conditions of southern Uzbekistan.
Key words: genus MeliaL, Phenology, flowering, fruiting, seed productivity, introduction, adaptation

INTRODUKTION

Plants reproductive biology is a special scientific problem that includes a comprehensive study of the reproduction process and ontogenesis interrelated stages with it: flower organogenesis, flowering, pollination, fertilization, embryogenesis, seed maturation, dissemination, etc. And since one of the most important criteria for plants introduction effectiveness is their ability to natural renewal under new growing conditions, above processes knowledge in relation to each introduced species is extremely important (Shevchenko, 2005).

This paper presents comparative study results of generative structures formation processes, flowering, pollination and seed formation in introduced species of the genus MeliaL. in the south of Uzbekistan.

Family MeliaceaeVent. Contains about 40 genera, including over 600 species, common in the tropical subtropical zones of the world (Shipchinsky, 1958). In the genus MeliaL. there are about 25 species, of which 2 species have been introduced here.

Research Objects and Methods.

The objects of research were representatives of the genus Melia.L - M.azedarach L. and M.toosendan SiebetZucc. Introduced to southern Uzbekistan.

M. toosendanSiebetZucc. systematically close to M. azedarach L. therefore it is sometimes considered as a variety of the latter (Shipchinsky, 1958).

The main goal of the research work was a comparative study of flowering, fruiting and seed productivity of two species of the genus Melia L.

Phenological observations were carried out according to N.E.Bulygin method (1979). Observations on flowering and pollination biology were carried out according to A.N. Ponomarev (1960) method, when studying pollination ecology, V.N. Golubeva and Yu.S. Volokitina (1986) methodological recommendations. Cytoembryological studies were carried out on permanent preparations prepared according to generally accepted methods (1954). The preparations were stained with methyl green and pyronine with an alcian blue tint (Shevchenko et al. 1986). The good quality of seeds was determined according to generally accepted methods (Interstate Standard ..., 1997).

Results and Discussion.

In the south of Uzbekistan, both types of neem pass into the generative stage from the age of 3 years. In the studied species, generative buds are laid on the shoots of the current year (Yoziev, Baysunov, 2009). In trees of this age, the genitals are initially formed in small numbers. On average, 5-6 inflorescences are formed on one plant. Such flowers bloom for 8-10 days. Often they do not form seeds. Flowering occurs in the 2-3 decade of April. On the 6-8th day after the beginning of flowering, massive flowering occurs. Duration of flowering of one tree in different years is 20-29 days.

In the conditions of southern Uzbekistan at this time, the air temperature is quite high, the rains practically stop, which contributes to the normal pollination of the studied species.

MeliaL genus species. is entomophilous plants. In the natural and introduced area, flowers of both neem species are pollinated by insects, mainly bees.

The flowers in the studied species are located in a complex inflorescence, by the type of growth they are sympodial, by the type of branching are dichasia. The flowers of M.azedarach L. and M.toosendanSiebetZucc are bisexual, actinomorphic, sharp and pleasantly fragrant, lilac in color, inflorescences 5, sometimes 4-6, growing at the base. Flowers 5, sometimes 4, are arranged alternately with buds.

The amount of pollen is 10, with a pollen filament intergrown with pollen. The beak of the genicea M.azedarach L. has a disc-like shape. In the node there are 5 (3-6) nests and the same number of ovules. Between the androecium and the gynoecium is a disc that captures nectar. In terms of flower morphology, M. azedarach L. is very close to M.toosendanSiebetZucc but differ from each other in the structure of the gynoecium. M.toosendanSiebetZucc has a capitate genitus.

The colors are revealed in the following order. At the beginning, the buds grow significantly, while the perianth increases by about 3 times. Then longitudinal cracks appear on the flower. These cracks are constantly widening, mainly at the top. Then the pollen sac begins to open to the side and becomes horizontal. During this period, the pollen sac cracks, and the pollen gets directly into the stigmas, since the seed is located below the pollen sac. After that, the petals are bent towards the pedicel, which allows the pollen sac to open.

Our observations show that in neem flowers from a cracked pollen sac, among the spreading pollen grains, in addition to undeveloped pollen tubes, there are also pollen grains with long pollen tubes. Several studies have shown that pollen grains can develop outside the pollen sac, that is, on other parts of the flower. It is also known that pollen grains can grow in cleistogamous flowers even when they are in the pollen sac. And also this rare phenomenon was observed in the flowers of neem trees (Fig. 1 b-c).

Neem flowers are located in complex inflorescences and belong to sympodial, i.e. a certain inflorescence according to the growth of the flower axis, and to dikhazy, i.e., a separate inflorescence by the type of branching. Their main axis ends in a flower, and their lateral axis grows in the opposite direction, and they also end in a flower.

The number of flowers on a shoot depends on the location of the shoots on the tree. On one shoot of M.azedarach L., on average, 24-25 inflorescences are formed, in each inflorescence -36 (28-44) flowers, in M.toosendanSiebetZucc these figures are 38-51 and 49 (40-59), respectively. These indicators may vary depending on the weather conditions of the year and the conditions of the growing trees.

Separate flowers of M.azedarach L bloom 3-4 days, inflorescence 12-15, tree 20-28 days. The flowering period of M.toosendanSiebetZucc is slightly longer - one flower blooms for 4-5 days, inflorescence -15-19, tree -24-29 days.

The dynamics of opening flowers in inflorescences and flowering of a tree depends on the temperature and relative humidity of the air. The largest number of open flowers falls on the day with the highest temperature and low air humidity.

When studying the dynamics of the daily opening of flowers, it was revealed that they open from 8 to 20 hours. The largest number of opened flowers is observed from 10 to 12 and 14 to 16 hours.

The assessment of seed productivity of tree and shrub species is an essential element in the characterization of native and introduced tree species, since natural and artificial regeneration of plant species occurs through the seed material.

In this regard, the study of the conditions for seed formation is highly relevant.

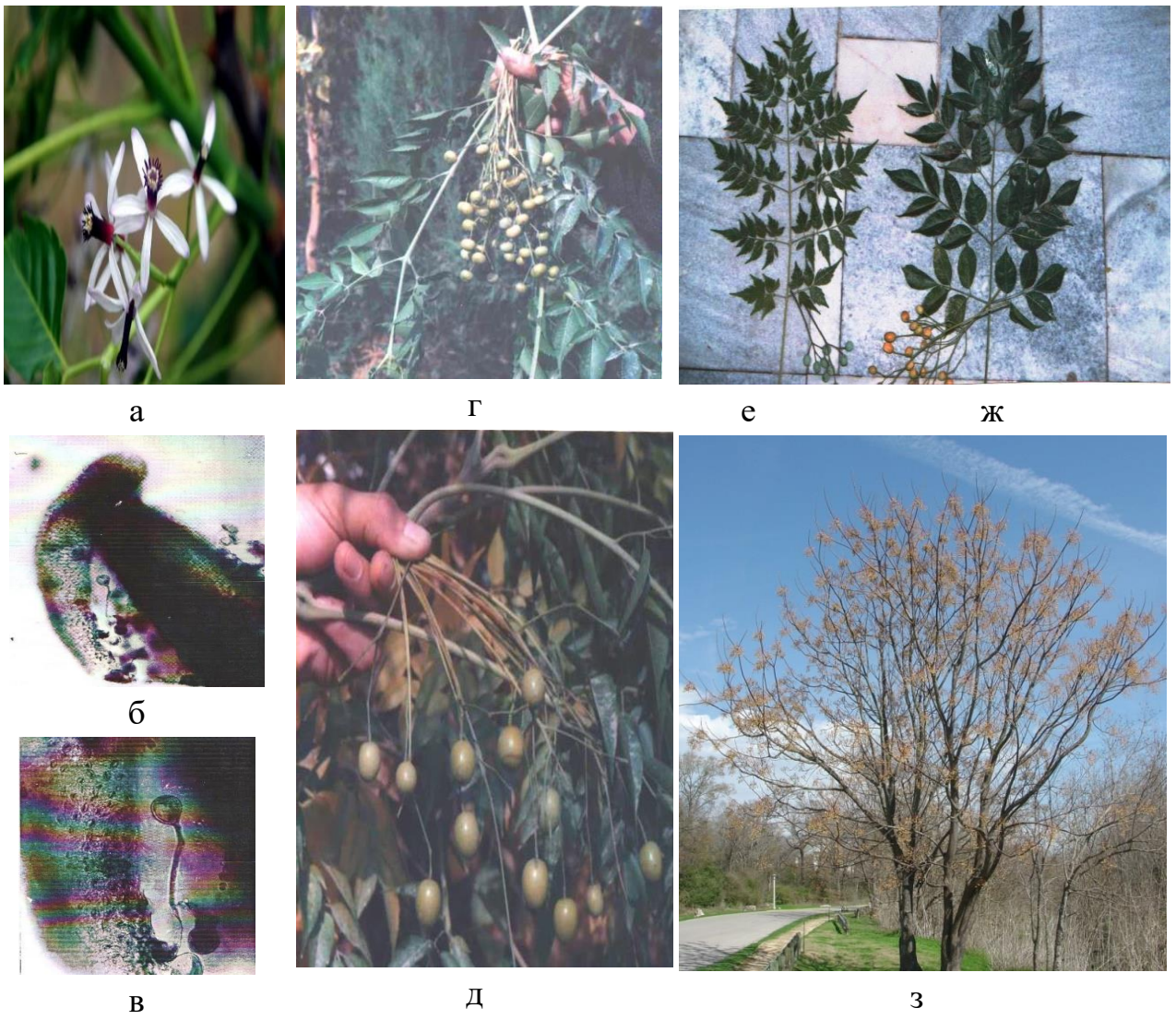

Fig.1. a). M.azedarach L.flowers., b) dry pollen grain in stigma bag. Ripe fruits; g) M.azedarach L; d) M.toosendan Sieb et Zucc.Leaf morphology; e) M.azedarach L; j) M.toosendan Sieb et Zucc; z) general view of fruiting trees.

After pollination in the MeliaL. Genus species after 2-3 days, the stamens color changes and the ovary begins to grow. After 60-70 days, the exocarp, mesocarp and endocarp layers are formed and the seed is formed. The fruit and seed ripen in 190-200 days. Seed productivity in the studied species of the genus MeliaL. Depends on plants age, growing conditions and weather conditions of the season. In particular, the 2019 neem seed yield was lower than last year. Apparently the fact that during the flowering period a lot of precipitation fell, washed

away the pollen of the flower and violated the pollination rate. However, pollen fertility in this season was 95-97%.

From 4-5 to 8-9 years, the number of generative shoots, inflorescences, flowers, fruits and the number of seeds in fruits increases. In 4-year-old trees, 2-3 seed fruits are most often found, in 9-year-old trees - 3-4 seed, and in 26-27 and 46-47-year-old trees, 1-2 seed fruits are most often found. Accordingly, the highest coefficient of seed productivity is observed in 5-8-year-old trees – up to 17.1-18.6% in MazedarachL and up to 12.6-12.7% in M.toosendanSiebetZucc. With increasing age of plants, this indicator decreases, in 46-year-old M. azedarachL. is 11.9%, 26-year-old M too send an - 9.8%.

It was also revealed that the number of seeds formed in fruits depends on the position in the crown. So, if on the upper and middle tiers in one fruit, respectively 2.8 ± 0.2 and - 2.5 ± 0.3 seeds are formed, then 3.4 ± 0.1 seeds in the lower ones ($P < 0.05$).

Conclusion

1. Data on the features of the formation of generative structures, flowering, pollination, fertilization and seed formation in M.azedarach L. and M.toosendanSiebetZucc under conditions of introduction in the south of Uzbekistan indicate their high adaptive capabilities, despite different natural habitats (M.azedarach L.– China, M.toosendanSiebetZucc - Japan).
2. In 4-year-old trees, 2-3 seed fruits are most often found, in 9-year-old trees - 3-4 seed, and in 26-27 and 46-47-year-old trees, 1-2 seed fruits are most often found. Therefore, the highest coefficient of seed productivity is observed in 5-8-year-old trees - up to 17.1-18.6% in M.azedarachL. and up to 12.6-12.7% in M.toosendanSiebetZucc. With increasing plant age, this indicator decreases, in 46-year-old M. azedarachL. is 11.9%, 26-year-old M.toosendan - 9.8%.
3. The results of the conducted comparative studies allow us to conclude that, in spite of the place of origin and natural habitat, these are representatives of the genus MeliaL. has a high adaptive potential to the extra-arid conditions of southern Uzbekistan.

References

1) Shevchenko S.V. Reproductive biology of introduced plants // Trudy Nikit. nerd. garden. 2005. – T.125. – 24-34 p.
2) Shipchinsky N.V. Sem. Meliaceae – MeliaceaeVent. // Trees and shrubs of the USSR. T.IV. - M. – L .: Publishing house of the Academy of Sciences of the USSR, 1958. – 263-267 p.
3) Bulygin N.E. Phenological observations on woody plants. – L .: Nauka, 1979. – 96 p.
4) Ponomarev A.N. Study of flowering and pollination of plants // Field Geobotany. 1960. – T.2. – 9-17 p.

5) Golubev V.N., Volokitin Yu.S. Methodical recommendations for the study of antecological features of flowering plants. Functional and ecological principles of the organization of the reproductive structure. - Yalta, 1986 . – 38 p.
6) Naumov N.A., Kozlov V.E. Fundamentals of Botanical Microtechnics. – M .: Selkhozgiz, 1954. – 165 p.
7) Shevchenko S.V., Ruguzov I.A., Efremova L.M. Methods for staining permanent preparations with methyl green and pyronine // Bul. Nikit. nerd. garden. 1986. – Issue. 60. – 99-101 p.
8) IS 13056.8-97. Seeds of trees and shrubs. Methods for determining benignity. – Minsk: Publishing house of standards, 1997. – 12 p.
9) Yoziev L.Kh., Baysunov B.Kh. Results and perspectives of MeliaL introduction. Southern Uzbekistan. – Tashkent: Publishing house "Fan", 2009. – 162 p.