

DETERMINATION OF SEX RATIO IN THE MASS REPRODUCTION OF THE PARASITE BRAKON (*Hebetor Say*) BY DIFFERENT METHODS IN A BIOLABORATORY

Anorbayev Azimjon Raimkulovich

Doctor of Agricultural Sciences, Professor

Bakhodirov Ulugbek Zokirjon o'g'li

Scientific Research Institute of Plant Quarantine and Protection

Abstract: *The article studies the sex ratio of the Bracon (*Hebetor Say*) parasite during mass reproduction in a biolaboratory. The experiment compared parasites reproduced using a new "Device for Reproduction of Bracon" and those produced by the existing method. When both groups of parasites were used to infest the host wax moth larvae the sex ratio under the traditional method was 6.4:3.6, while under the new device-based method, it was 7.9:2.1.*

Keywords: *Bracon, entomophage, parasite, B. hebetor, device, insect, sex ratio.*

INTRODUCTION

Today, in many countries around the world, including our own, obtaining a high-quality and environmentally clean yield from agricultural crops is of great importance. In achieving this, the biological method of plant protection plays a crucial role and is widely used both globally and domestically. Entomophages occupy a special place in biological control against pests. Currently, various entomophages such as *Chrysopa carnea* (Green Lacewing), *Trichogramma*, and *Bracon* are being mass-produced in biolaboratories across our country and effectively used to control agricultural pests in crop fields. In addition, Uzbek scientists are conducting several practical studies to introduce new species of entomophages from abroad (introduction) and to increase the effectiveness of existing ones. The population of *Bracon* in Uzbekistan has adapted well to the extreme summer conditions of Central Asia. Their high level of ecological adaptability allows these parasites to withstand temperatures of up to 35°C and humidity levels ranging from 30% to 50%. The maximum rate of oviposition (egg laying) occurs at a temperature of 30°C and a humidity level between 50% and 70%. The optimal developmental temperature was recorded at 37.8°C, while the minimum was 12.4°C [2]. For the wide-scale use of beneficial insects, one of the current challenges is the mechanization of their mass reproduction, as well as their distribution in fields and other related processes. In particular, many studies are being conducted on the introduction and acclimatization of beneficial insects from other regions [4]. Under changing natural conditions, a significant portion of

entomophages perish. Only 14.3% of Bracon individuals survived when placed in natural conditions for preservation. Therefore, it is advisable to induce diapause in them in biolaboratories and store them for long-term preservation [3]. When Bracon searches for its prey, it identifies its host larvae by the smell of the host itself or by the scent of its excrement. This enables Bracon to easily locate larvae that are hidden inside plant fruits. Adult Bracon individuals can survive for 2–3 days without food in summer, while those that feed on different nutrients (such as hemolymph or carbohydrates) can live from 12 to 30 days [1]. Overall, the differences between *B. brevicornis* and *B. hebetor* are not significant. In laboratory conditions, both Bracon species reproduce best on a single host larva at temperatures between 20–27°C, which produces the highest number of generations and a female-biased sex ratio. When multiple host larvae are used, more total offspring are produced, but the number of offspring per larva decreases. The highest number of generations was again observed at 27°C, and the sex ratio was found to be independent of temperature. At 12°C, no parasites emerged, while at 36°C, very few did; however, the host larvae were still paralyzed. The effectiveness of *B. brevicornis* remained above 80% across all temperature ranges and regardless of the number of host larvae. *B. hebetor*, however, showed less than 80% efficiency at 12°C and 27°C when a small number of host larvae were available [5].

Research Methods: The experiments were conducted during 2022–2024 using methods commonly applied in entomology and agricultural entomology. In the process of reproducing entomophages in biolaboratories and determining their sex ratio, the methods developed by Kh. Kimsanbayev were utilized. The study examined the sex ratio of Bracon parasites reproduced using the newly developed “Device for Reproduction of Bracon” as well as those reproduced by the conventional method.

Research Results: The study was conducted during 2022–2024 in the biolaboratory of the Scientific Research Institute of Plant Quarantine and Protection. Based on scientific sources, observations were carried out to determine the sex ratio of the Bracon parasite reproduced using the newly developed “Device for Reproduction of Bracon” and the existing conventional method.

The observations were aimed at studying the sex ratio of the bracon parasite (*Hebetor Say*) and were conducted in 3 variants with 4 replications. In the first variant, the research was based on data provided in scientific sources; in the second variant, on the existing method; and in the third variant, on the “Device for Breeding Bracons.”

To determine the sex ratio of bracon parasites bred in these three methods, 200 wax moth larvae were placed in each cassette of the second and third variants,

following the scientific data from the first variant. After the larvae settled, they were exposed to bracons at a 7:3 ratio.

Due to various damages, the number of dead larvae averaged 15 in scientific sources, while in our observations it was 17.2 in the existing method and 8.6 in the device method. The number of larvae infected by parasites averaged 182.8 in the existing method and 191.4 in the device method.

According to scientific sources, an average of 10 bracons emerged from each infected larva, totaling 1850 individuals 555 males and 1,295 females corresponding to a ratio of 7.3:3.7. In our observations, an average of 8.4 bracons emerged from each infected larva using the existing method, totaling 1,535.5 individuals 552.8 males and 982.7 females giving a ratio of 6.4:3.6. Using the device method, an average of 10.7 bracons emerged from each infected larva, totaling 2,047.9 individuals 430 males and 1,617.9 females corresponding to a ratio of 7.9:2.1.

(Table 1).

Sex ratio of the bracon parasite in mass rearing by various methods in a biolaboratory
 (Scientific Research Institute of Plant Quarantine and Protection Biolaboratory, 2022–2024) Table 1

T/r	Variants	The sex ratio of bracon wasps released for infestation (100 bracons)	The number of larvae exposed to infestation (pieces)	The number of larvae that died as a result (pieces)	The number of larvae infected by the parasite (pieces)	The average number of bracons emerged from a single larva	The number of emerged bracons (pieces)	Of which		Ratio
								Female	Male	
1	In scientific sources	7:3	200	15	185	10	1850	1295	555	7,3:3,7
2	In the existing method	7:3	200	17,2	182,8	8,4	1535,5	982,7	552,8	6,4:3,6
3	In the device for breeding bracons	7:3	200	8,6	191,4	10,7	2047,9	1617,9	430,0	7,9:2,1

Note: Air temperature 28–32°C, relative humidity 65–75%.

CONCLUSION

In conclusion, as can be seen from the above data, the sex ratio in the existing method was 6.4:3.6, while in the “Device for Breeding Bracons” method, the ratio was 7.9:2.1.

It is recommended that all biolaboratories in our republic use the “Device for Breeding Bracons” to breed and release bracon parasites in order to increase their effectiveness.

BIBLIOGRAPHY:

1. Арсланов М ва б. Мевали боғлар, дуккакли дон экинлар, полиз ва сабзавот ҳамда бошқа турдаги қишлоқ хўжалик экинлари зараркунандалари, касалликларини тарқалишини ҳисобга олиш 2- қисм Тошкент 2019 -Б 251-252

2. Кимсанбоев.Х.Х, Чўтибоевич.Х.Б, Куйдимуротович.Х.Н Bracon биоэкологияси ва кўпайтириш технологияси Тошкент 2016 -Б 18-31.

3. Саидова З, Хайитов Э "Браконни(Bracon hebetor Say) биологатория шароитида сақлаш" Ўсимликларни химоя қилишда уйғунлашган химоя қилиш тизимининг ўрни ва истиқболлари Тошкент 2016 -Б 24-27.

4. То'хтайев Sh, Хауруллойев М ва б. "Biolaboratoriyalarda katta mum kuyasini (galleriae mellonella l.) ko'paytirish va uning sifat ko'rsatkichi" International scientific journal science AND innovation special issue april 6, 2024 .- №2.-b.757-761.

5. https://www.researchgate.net/publication/351916259_Bracon_wasps_for_ecological_pest_control-a_laboratory_experiment