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# NEW CONTRIBUTION CONCERNING THE MASS REARING OF *TANYMECUS DILATICOLLIS* GYLL (COLEOPTERA: CURCULIONIDAE) UNDER CONTROLLED CONDITIONS

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***Abstract***

*Controlled growth in the laboratory of some species of insect's are justified both scientifically and practically. Due to the economic importance that the corn crop pest Tanymecus dilaticollis Gyll. (Coleoptera: Curculionidae) had in Romania like the main pest of maize crops we tried to obtain successive generations under environment controlled of the insect mentioned. In this paper we aim to improve the efficiency of the multiplication of the species with respect to two aspects: attending larval and multiplication high efficiency. The coefficient value of 20, 90 obtained by us indicate a considerable increase in performance compared to previous attempts multiplication thus increasing your chances of recovery of this method of mass multiplication.*

***Key words*: *maize pest,* mass rearing, *Tanymecus dilaticollis Gyll***

## INTRODUCTION

Minimizing the losses caused by competitors for man's crops has always been as essential component of agriculture and will become increasingly important if the growing demands for food and materials created by a rapidly expanding population are be met. Crop protection was revolutionized by the introduction of modern synthetic pesticides [3], [4], [14], [16], [18]. Their subsequent extensive use has sometimes exposed limitations, stimulating increased interest in alternative methods but used properly, they remain a very flexible, powerful and often economical method of control, capable of considerable further development [5]. It is inconceivable that they will be displaced on a large scale in the predictable future and it is therefore vital that the search for better compounds and methods of application is maintained. There is scope for improvement in several directions. First, there are at present no satisfactory chemical treatments for some important damaging organisms, notably viruses, and in other cases existing treatments are barely effective enough or are on the limit of economic viability so that more potent toxicants would be an advantage. The development of resistance to both insecticides and fungicides also creates a pressing need for new active structures; at least some examples of resistance can now be found in almost all insect pest species of agricultural, veterinary or medical importance [10], [15]. In considering that facts and from an ecological standpoint, special attention will be given to various possibilities and properties contributing to increase selectivity and one of strategic direction are the mass rearing methods for industrial or semi industrial production of biological material used in the various test pesticides need.Controlled growth in the laboratory of some species of insects is justifying both scientifically and practically. On one hand, it becomes possible to deepen the knowledge of the development cycle of the species, with all its peculiarities and on the other hand, obtaining different stages of insect creates a basis for organizing independent of the numerical experiments of natural populations of the season. Most laboratories in the world are concerned with entomological different purposes growth of harmful insects or useful (Metapa (Mexic), Waimanlao (Hawaii), Stoneville and Boll weevil research laboratory (Mississippi), Phoenix (Arizona), British Columbia (Canada), Mission (Texas) and Niles (Michigan) [1]. Due to the economic importance of the pest in our country, was tried in previous work [11], [13] to obtain successive generations of the species *Tanymecus dilaticollis* Gyll. under environment controlled conditions. This paper is an attempt to improve the efficiency of multiplication of this species based on a method developed by Paulian [12].

## MATERIALS AND METHODS

The experiment was conducted in Bucharest RIDPP laboratory in greenhouse and room thermostat conditions. Biological material, i.e. individuals of *Tanymecus dilaticollis* adults, a batch of the first generation ($G_1$), consisting of 31 males and females was obtained in the laboratory from a lot of adults, males and females ($G_0$) collected from the field between 1-10.04.2012 of the experimental land Fundulea and S.C. AGRODEZ DANRO SRL, from Cornăţelu, Dâmboviţa County. Feeding adults ensure their reproduction and hatching larvae was performed by the existing method [11], [12].
To increase larval pupation and getting new adults were studied two variants:
Variant 1
Recipient: ø 8 cm plastic Sarpagan
Support: 50% + 50% sand soil
Food: root maize plants sown early experience without wetting
Variant 2
Recipient: ø 8 cm plastic Sarpagan
Support: 70% + 30% sand soil
Food: root maize plants sown in succession with the wetting.

Table 1. Major ingredients for artificial diet and quantity used for adults mass rearing

| DIET INGREDIENT | Quantity kg/month | Quantity kg/year |
|---|---|---|
| CORNSEED MEAL | 645 | 27,090 |
| CORNSEED MEATS | 148 | 6,216 |
| PROMINE D | 152 | 6,384 |
| AGAR | 107 | 4,494 |
| SUGAR | 96 | 4,032 |
| CORNCOB GRITS | 48 | 2,016 |
| OTHER | 54 | 2,268 |
| TOTAL | 1,250 | 52,500 |

## RESULTS AND DISCUSSIONS

The design of facilities for culturing insects is, or should be, a key topic in the broader subject of insect rearing [6]. Research on insects can be facilitated in many ways if the insect species under study can be colonized and produced in the quantity needed for both basic and applied investigations. We shall consider and discuss some of the lines of research that are greatly facilitated by having the means to maintain thriving insect colonies [7]. Basic information on the life history and behaviour of insects has always served as a guide to the development and efficient application of certain types of control measures. Much has been accomplished by observing the development and behaviour of insects under field conditions. However, detailed information on the development of various stages of an insect under a wide range of field conditions is often difficult and impractical. The ability to colonize an insect makes it possible to obtain information about the biology of an insect more precisely and with less effort. Scientists are becoming more and more interested in the details of the development and behaviour of insects in their efforts to devise new ways to control them or to utilize them if they are beneficial. It may be of vital importance, for example, to have precise information on the period from the time an insect emerges as an adult until it mates or until the first eggs are deposited. The

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time of mating of an insect after emergence and the frequency of mating may be significant factors in the application of the sterile insect release technique. The behaviour of insects in relation to mating stimuli, attractants in food, and other attractants is a subject of increasing interest to entomologists. Close observations and appropriate experimental procedures under laboratory conditions may be the only way to obtain the information desired [8], [9]. We might add a note of caution in the study of insect biology and behaviour. As valuable as laboratory observations may be to obtain such information, appropriate investigations should be undertaken on field populations as well. A thorough understanding of the physiology of insects is regarded by many scientists as our best hope to keep ahead of insect problems. We cannot expect to conduct the precise and complex research involved in studies of the various physiological processes in insects unless the insects under study can be colonized and investigated in the laboratory. Field-collected insects are too variable in age, nutritional condition, and general health to be employed for critical physiological studies. The greatest deterrents to the continued successful use of insecticides are the capacity of insects to develop resistance to them. Much research has been conducted to obtain basic information on the mechanisms of resistance in insects and on the genetics of the resistance factors. Obviously, such investigations cannot be undertaken with field-collected insects. So long as we must rely on insecticides as our chief weapon for insect control, we will need to continue and perhaps intensify research on the insecticide resistance problem [1], [2], [17]. The ability to colonize our major pest species will become of increasing importance to facilitate research on insecticide resistance mechanisms and how they might be overcome. The relationship of insects as vectors of plant and animal diseases is another area of study that is of vital importance. Investigators in the past made progress in this area by utilizing field-collected material, but many vital questions regarding vector-host relationships can only be answered through carefully controlled laboratory studies with insects grown under controlled conditions. The outstanding progress in the development of new insecticides, fumigants, repellents, and other insect control chemicals during the past two decades is due in large measure to the advances that have been made in our ability to colonize insects and to the parallel development of techniques for evaluating candidate insect control chemicals in the laboratory. Basic studies on the nutritional requirements of insects are of vital and increasing importance to entomology. Here again thriving laboratory colonies are essential for the conduct of research of this nature. Finally, I should like to mention the importance of the ability to rear insects of many species and diversified types in support of basic studies in the field of insect taxonomy and classification.Insect taxonomists have done a remarkable job, but they have been toiling under great handicaps for centuries because, for the most part, they have had to rely on field-collected and preserved specimens in their research on the classification of insects. This procedure will continue to be necessary and productive. However, in order to make real progress in obtaining answers to critical questions in the field of species relationships, scientists in this field must also have the facilities and the means to study living material. As applied research progresses into methods of insect control based on the behaviour of insects, the need will be increasingly great for the most reliable information possible on speciation, varieties, and strains of important species complexes. Insects from different ecological areas may show marked differences in responses to different hosts, to natural biotic agents, to each other, or to their environment in general. Until critical studies are undertaken with living material to supplement conventional taxonomic investigations, the scientists attempting to develop some of the newer approaches to insect control may encounter many serious obstacles. The ability to colonize insects of many kinds will be a necessity in order to obtain the type of information that applied entomologists will expect from taxonomists in the future.Since some important aspects of the growth process of *Tanymecus dilaticollis* species such as the degree of adaptation to the conditions of captivity, feeding and longevity of adult female prolificacy, fertility eggs have been previous studies [11], [13] we have proposed a reference to two issues: the larval stage completion and return of multiplication.

**1.The larval stage crossing**

Ensure optimal conditions for the growth and development of larvae remains cardinal problem without solving which can not be determined an effective technology for increasing *Tanymecus dilaticollis* successive generations of the species. In our investigation of the total of the experience gained in 2,205 larvae and adults were obtained 523 that is a percentage of 23.71 %. This percentage is higher still existing data; the highest value in a succession of generations was 10.3 % [15]. Maintenance phase "soil" that larva in its development through presupposes a strong modification of normal environmental conditions that it is in nature, especially in the balance of physical factors: pH, salt content, moisture, etc. Being difficult to control these factors causes increased mortality of larvae during this period. Soil is, on the one hand, a powerful contamination and allows fate and action of antagonistic organisms.

In this direction it is necessary for larval life stage of soil to be removed and this is one of the issues that we propose for the future.

**2.Multiplication efficiency**

The multiplication coefficient from which depend the colony maintaining, expressed by the number of adults obtained from a female was substantially improved from 20.90 in the 4th generation of success (Table 2).

Table 2. Propagation efficiency of multiplication under controlled conditions of species *Tanymecus dilaticollis* Gyll.

| GENERATION | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| TOTAL | 93 | 20 | 178 | 232 |
| MALES ♂ | 62 | 6 | 77 | 85 |
| FEMALES ♀ | 31 | 14 | 111 | 147 |
| EFFICIENCY NO. IMAGO/ FEMALE | - | 6,45 | 12,71 | 20,90 |

Moreover, this parameter had an increasing trend over the 4 generations reflecting some progress in improving growth variants. However multiplication performance is still at a level sufficient to allow proliferation and prosperity of the colony. Analyzing the factors that influenced the successive multiplication of the insect is found:

- A female sterility 47.96% of the whole experience.

No doubt there are sterile and females in nature, due, among other factors, and malformations of ovaries and oogenesis disturbance processes. However, sterile insects reared under laboratory conditions far exceeded the phenomenon of nature without yet knowing the exact causes. If we consider the ecological offered totally different than from nature of abiotic and biotic factors, it should be noted, however, variability in the behavior of individuals. While some dams have made no clock, others in the same environmental conditions far exceeded the average values obtained in nature. For example, a number of 13 second-generation females have made much higher than the average of the 70 eggs, which is considered normal for the entire period of deposing eggs period in nature, resulting in a mean of 140 eggs. It follows that for a part of the female, provided environmental conditions have not produced an inhibition of reproductive function. Since the experience was organized in couples (♀ and ♂) can males, at least in some cases, to be that which determined the level of fecundity of females.

- Fertility eggs at a level of 43.73% on the whole experience also influenced the yield considerable of multiplication.

- In addition to some gaps in the technology used, gaps reflected in providing optimal conditions for the incubation period, it is assumed that the whole experience reduced fertility of eggs was the result of physiological disorders in genesis of eggs processes.

## CONCLUSIONS

The species *Tanymecus dilaticollis* Gyll., is adapted to life in captivity, performing their entire life cycle in good condition and can achieve high levels of prolificacy and longevity, well above the maximum considered natural conditions.

Since the differences between the two versions are used to increase larval notable unification we propose to simplify the study in a single, variant called "larval rearing method" that will aim to improve through further research.

To detect causes physiological disturbances that occur in the succession of generations requires a thorough pathological study as further developments of insect multiplication technique in an appropriate space of this technology.

The considerable increase in yield obtained by multiplying the values we as ascending obtained allow us to conclude that these values can be substantially improved growth even under natural environment for food, thus increasing your chances of recovery of the multiplication process table.

The ability to colonize insects can represent direct and indirect contributions to many aspects of entomology. The many lines of research in entomology that are facilitated by the availability of thriving insect colonies have been discussed in this introductory chapter. The possibility of controlling insects directly by utilizing the insects themselves or by utilizing products derived from insects may be of equal value to the science of entomology. Insects in large numbers may be needed in the future to control insects by releasing sterile insects, by using caged insects to attract and destroy their own kind, for the production and use of attractants, for the production and use of insects pathogens, insect parasites, and predators, or for producing growth-regulating substances for insect control.

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