



Insect Artificial Diet: A Tool for Mass Rearing of Insect

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Men made food for insects can be called as insect artificial diet (AD). Insect rearing is pivotal to many areas of entomological research leading to successful production of beneficial insects and their products, and also in insect pest management. Rearing of insects on their natural hosts is time consuming due to regular change of plant material and also involves more manpower. Not only a lot of plant material is wasted but also frequent handling of the culture results in high mortality of the insects. These drawbacks have led to evolve artificial diets.

Need for insect artificial diet

Insects are reared in the laboratory for various purposes. They may be reared either on their natural food or artificial diets. Developing artificial diets may be difficult and time consuming but once optimized, artificial diets usually are simple to prepare and easy to use. Because they are processed from commercial ingredients, they are available year-round and generally cost-effective. With proper quality control procedures, it is possible to rear high-quality insects on artificial diets which are comparable and sometimes superior to those raised on their natural food. To date, a large number of artificial diets have been developed and many species are being reared successfully on these diets.

Development of insect artificial diet

The first artificial diet for insect was developed by E. Bogdanow in 1908, for rearing of blue bottle fly, *Calliphora vomitoria*, from egg to adult on a diet of meat extract, starch, peptone and mineral salts. Böttger (1942) and Beck *et al.* (1949) developed diets using highly purified natural products for the European corn borer, *Ostrinia nubilalis*. These two works present the beginning of the development of modern artificial diets for phytophagous insects.

Types of insect artificial diet

Holidic diets: Diets in which the ingredients can be represented by chemical formula are known as chemically defined diets or holidic diets. This diet consists of entirely of known pure chemicals. But by the definition, a holidic diet for silkworm may not exist. Contaminants are commonly present in many of the components, such as agar used in the diet. Perhaps the amino acid diet may be regarded as one of the holidic diets. The holidic diets are most desirable for critical nutritional studies.

Meridic diets: Diets containing one or more unrefined plant or animal substance (plant tissue, liver powder or extracts, yeast, wheat germ) are called as meridic diets or semi-synthetic diets. Meridic diets composed of mostly of defined chemicals, but with one or more ill-defined components, such as well defatted soybean meal in semi-synthetic diets of silkworm.

Oligidic diets: Diets made up of crude materials. They are designed to imitate the natural food and are assumed to have all the required nutrients with undigestible inert material. These

diets are used for mass rearing of insects and are known as oligidic diets. Oligidic diets consist principally of crude natural materials such as mulberry leaf powder. These types of diet are used in large scale rearing projects when the components are readily accessible and inexpensive, and produce larvae or cocoons in mass or use in studies that do not involve nutrition as a parameter of investigation.

Examples of artificial diet

1. Composition of Artificial diet for fruit fly, *Drosophila melanogaster* Ingredients Quantity
1 Maize flour 150.00 g 2 Jaggery 130.00 g 3 Dried yeast 22.00 g 4 Agar-agar powder 20.00 g 5 Propionic acid 5.00 ml 6 Tap water 1500.00 ml Lewis, E.B. (1960). A new standard food medium of *Drosophila melanogaster* prepared at the Department of Biology, University of Gregon. *Drosophila Information Series No. 34*: 117-118
2. Composition of artificial diet for stem borer, *Sesamia inferens* Ingredients Quantity
Fraction A 1 Green gram (*Vigna radiata*) powder 70.00 g 2 Dried maize leaf and whorl powder 5.00 g 3 Sucrose 2.00 g 4 Wheat grain powder 18.00 g 5 Ascorbic acid 1.70 g 6 Methyl paraben (Methyl-p-hydroxy benzoate) 0.80 g 7 Sorbic acid 0.40 g 8 Vitamin E (Viteolin capsule 100 mg) 0.10 g 9 Yeast powder 5.00 g 10 Formaldehyde 1.00 ml 11 Distilled water 260.00 ml Fraction B 12 Agar-agar powder 6.00 g 13 Distilled water 130.00 ml Siddiqui, K.H., Sarup, P. and Marwaha, K.K. (1983). Formulation of artificial diets for mass rearing of the pink borer, *Seasmia inferens* walker, in the laboratory. *J. Ent. Res.* 7(2): 154-160

Artificial diets developed for rearing of insects

Siddiqui and Dey (2002) have compiled information on insect artificial diets for phytophagous insects, insect parasitoids and predators, covering about 70 insect species belonging to the economically important orders, viz. Lepidoptera, Diptera, Coleoptera, Orthoptera, Hemiptera, Hymenoptera and Neuroptera.

Importance of insect artificial diet

The insects on artificial diets can be reared round the year. The formulation of artificial diets has made feasible the mass rearing of a large number of insects in the laboratory. The availability of large number of insects through rearing on artificial diets has added new dimensions in investigating diverse entomological problems such as physiological, toxicological, biological control and host plant relationship. However, the success of mass rearing would depend to a large extent on the use of minimum number of diet ingredients available indigenously, easy preparation and rearing technique as also low cost of insect production.

Concluding remark

On the basis of available published literature on artificial diets for insects including silkworms, it shows that there is a wide scope for doing research in the area of forest entomology, utilizing different tree species as forest resource. This artificial diet will be very helpful for carrying out complete life cycle of pests, parasitoids, predators and experiments related to pest management.