

An Automated System for Dispensing Fly Food into Drosophila Vials



APPLICATION NOTE AN1046

APPLICATION BENEFITS

- Customizable system to use technician's choice of vessel
- Works with most brands of peristaltic pump
- GX-281 provides high throughput capabilities
- Hands-free operation

ADDRESSED ISSUES

- The time-consuming and labor-intensive process of preparing vessels with fly food is avoided by using the fully automated system.

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INTRODUCTION

The vinegar fly, or fruit fly (*Drosophila melanogaster*, Figure 1), is an excellent animal model for studying the underlying mechanisms of human disease. The fruit fly was one of the first organisms ever used for genetic research over 100 years ago, and is the most well-known of all eukaryotic systems even today. *Drosophila* is used in a variety of fields, including the study of aging, immunity, diabetes, cancer, autism, birth defects, sleep disorders, and neurodegenerative diseases. *Drosophila* research remains at the forefront of medical studies due partially to the fact that humans and fruit flies are quite similar at the molecular level. Around 75% of known human disease genes have a recognizable match in the genetic code of *Drosophila melanogaster* (Reiter, et al., 2001), and 50% of fly protein sequences have mammalian analogs.



FIGURE 1

Drosophila melanogaster close up (left) and in a laboratory setting (right)

There are several advantages to using fruit flies over other animal models such as rodents. With *Drosophila melanogaster*, one can begin with a list of genes active in the egg and follow the morphological changes and gene activation through adulthood (Brody, 1995). Fruit flies are easy to handle, small in size, and have a short life-cycle, allowing the researcher to quickly evolve many generations in a short time. They are also relatively inexpensive and easy to keep in large numbers, which helps with meeting the high demand from research markets.

In preparation for use in research studies, *Drosophila* larvae must eat and grow continuously over a four-day period before hatching. Large amounts of fly food must be prepared and dispensed into culture tubes or other vessels -- a process that can be time-consuming and labor-intensive. This application note describes the use of an automated instrument to alleviate this bottleneck.

MATERIALS AND METHODS

Fly food is a gel at room temperature. When heated to 65 °C, it becomes a liquid with the consistency of thin oatmeal, which can be dispensed into tubes or vials. There are several ways to make Fly Food, and a typical recipe is shown in Table 1 below.

Table 1

Example Fly Food Recipe

(Yale School of Medicine, New Haven, CT)

Ingredient	Quantity
Water	57,200 mL
Agar	355 g
Molasses	4,700 mL
Corn Meal	3,840 g
Yeast	510 g
Propionic Acid	745 g

Propionic acid is added as an antifungal agent. There are alternative formulas that utilize the commercial anti-fungal agent known as Tegosept (which contains methylparaben).

These ingredients are mixed in a large heated pot with a large stainless steel stirrer (Figure 2). The fungicidal agent is added last after the solution has cooled to prevent any heat inactivation. The solution is then ready to dispense into appropriate vessels.

FIGURE 2

Heated pot with stirrer for making fruit fly larva food



AUTOMATED WORKFLOW

Automatic fly food dispensing is accomplished using the Automated Fly Food Dispenser from Gilson (Figure 3). A user loads the *Drosophila* vials of choice onto the system, and the software automatically positions a multi-channel dispensing head just over the top of the vial. Fly food is delivered by pump to quickly and efficiently fill the entire tray. The pot shown in Figure 2 serves as the reservoir from which the heated fly food is pumped, and a customized tubing sinker is included with the system which holds the inlet line down inside

the reservoir. After the system finishes dispensing, the fly food is allowed to cool. The user then adds the fly larvae and seals the vials.

The system is compatible with most common vial sizes, and may be further customized to meet any unique user requirements.

**FIGURE 3**

Automated Fly Food Dispenser from Gilson

Gilson offers the Automated Fly Food Dispenser with a Watson Marlow 620 DI Pump with a 625L pump head (Figure 4). Typical flow rate for the setup is around 1.4 L/min. While this configuration is recommended, it is also possible to work with other pumps as preferred by the end user. This may require some modifications to the software.

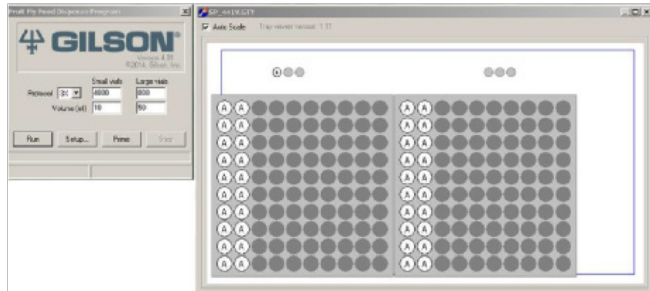
**FIGURE 4**

Watson Marlow 620 DI Pump with 625L head

The system is controlled via laptop or PC with a special software program (Figure 5). The program is currently available for Windows XP/7/10 operating systems.

FIGURE 5

Software program to control the Automated Fly Food Dispenser Windows is a registered trademark of the Microsoft Corporation.



CONCLUSIONS AND BENEFITS

This article describes a fast and effective automated method for filling vials and/or culture tubes with fly food in order to grow large numbers of *Drosophila melanogaster*.

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