An. Inst. Biol. Univ. Nal. Autón. de Méx. 47, (1976) Ser. Biol. Exp. (1): 47-51. 30-VIII-1982

NEW SYSTEMS FOR CONTROLLING THE HOMOGENEITY OF SEED-WASH AND THE TREATMENT OF SEEDS WITH SOLUTION

Miguel Angel Meneses and
Abraham Rublúo
Laboratorio de Genética y Radiobiología, Instituto de Biología, UNAM. México 20, D. F., México.

ABSTRACT

Two experimental systems are described, one for washing seeds in tap water under constant pressure and the other for assuring homogeneity when seeds are treated with chemical agents in solution.

RESUMEN

Se presenta la descripción de dos aparatos, uno para efectuar el lavado de semillas en agua corriente con presión constante y otro que permite homogeneizar los tratamientos de semillas con agentes químicos en solución.

Introduction

It is a common practice in the handling of seeds and particularly cereals, to treat them with water or some chemical substance for any one of a variety of purposes. For example, it is used in germination studies (Mikkelsen and Sinah, 1961; Abdul-Baki, 1969) to determine the action of chemical substances on seeds (Tomkins and Grant, 1972), and is used especially in investigations concerning chemical mutagenesis where presoaking treatments (Yamaguchi, 1976) and post-treatment washings (Gichner *et al.*, 1972) are common. However, the authors usually report their methodology only in a very superficial way, disreagarding the importance of the experimental techniques employed.

It is critical in this kind of research to maintain treatment as homogeneous as possible because sometimes the material being tested presents a high degree of variability in its response (Ehrenberg, 1971) and this makes the interpretation of results quite difficult.

Description

In this paper the designs of two systems are presented which include a seed-wash set-up and another apparatus for carrying out the treatment itself. These designs when taken together make the process (pre-treatment, treatment and post-treatment) highly homogeneous. In addition, the handling and manufacture of the system is very simple.

The apparatus shown in figure 1 was designed in order to have a constant, equal wash pressure in several batches at the same time. It has two main parts, one for maintaining constant pressure and the other for seed washing. The first part consist of a stainless steel cylinder (A) 16 cms in diameter and 34 cms high, on top of which there is a 1/2 inch tube (B) joined by a hose to the general source, tap water or any other liquid. A graduated glass conduit (for example, a pipete) is connected to the lower side of the cylinder (C). It runs parallel to the wall of the chamber and indicates the water level inside. Coupled to the bottom of the container are several copper spouts (ten in our case) (D) all of which have the same specifications: 7 mm in diameter and 5 cm long. They are joined to an equal number of plastic hoses 30 cm long through which water flows from the cylinder and simultaneously washes the seeds in the different batches. A 1/2 inch copper tube, 12.5 cm long, (E) placed within the cylinder has its outlet on the lower side near the base of the chamber. It is connected to a drain by means of a hose and maintains the liquid height in the chamber at 12.5 cm. Careful handling of the tap of the general feeder makes this quite easy to achieve. As a result the outflow pressure is the same in all the copper spouts, being governed by the relation

$$P = \rho g h$$

where P is the discharge pressure, ρ is the density of the liquid, g is gravity and h is the height of the liquid column. Because liquid density and gravity are the same in a given experiment, the pressure depends only on the height of the liquid column which is maintained constant by the system just described. Hence, the discharge pressure in each of the tubes is the same and is constant.

The washing of the seeds in carried out in individual glass tubes (F) 13 cm long and 1.5 cm in diameter at the bottom of which there is a doubled piece of gauze (F') held on with an elastic band (F"). This allows free circulation of the wash liquid around the seeds and through the tube. The tubes are held in a portable rack, all of them at exactly the same height, by means of an elastic band (F"') in the upper part that clamps the tubes to the rack. With this system it is possible to have the seeds in a constant, highly homogeneous wash for any period of time, without risk of loss or mixture of the material being tested. The specifications of the tubes can be varied according to individual needs. The size indicated here was used with sucess with barley and triticale seeds in batches of 100.

To procure high homogeneity in the seed treatment itself, the following bubbling system was designed (Fig. 2). It consists of an air compresor (A) connected to a pressure distributor (B), a simple matrav,* by and adecuate set of glass tubes

* If the compresor used works with oil, is highly reccomended to use a cotton filter for to stop contaminants.

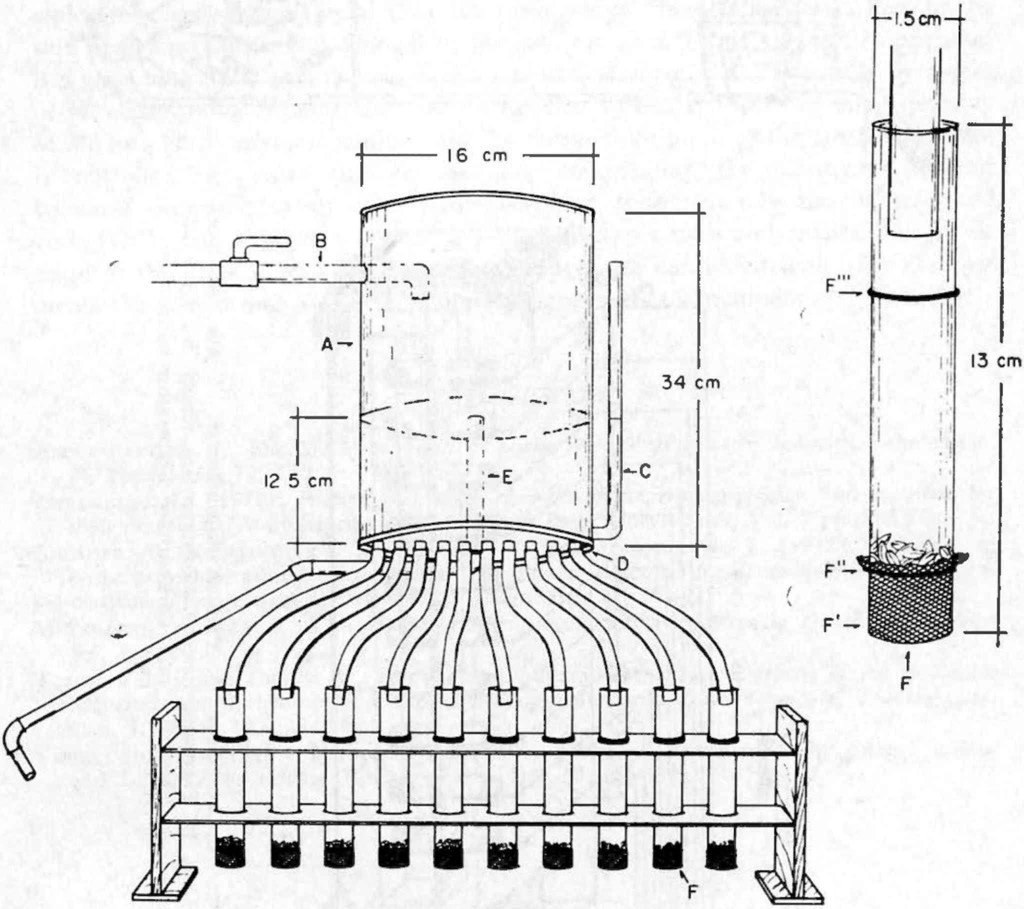

Fig. 1. Seed wash equipment used in pre and post-treatment. A. Stainless steel cylinder. B. Entrance for running tap water. C. Water level indicator. D. Copper spouts. E. Copper drain pipe. F. Wash tubes. F'. Gauze. F'' and F'''. Elastic band.

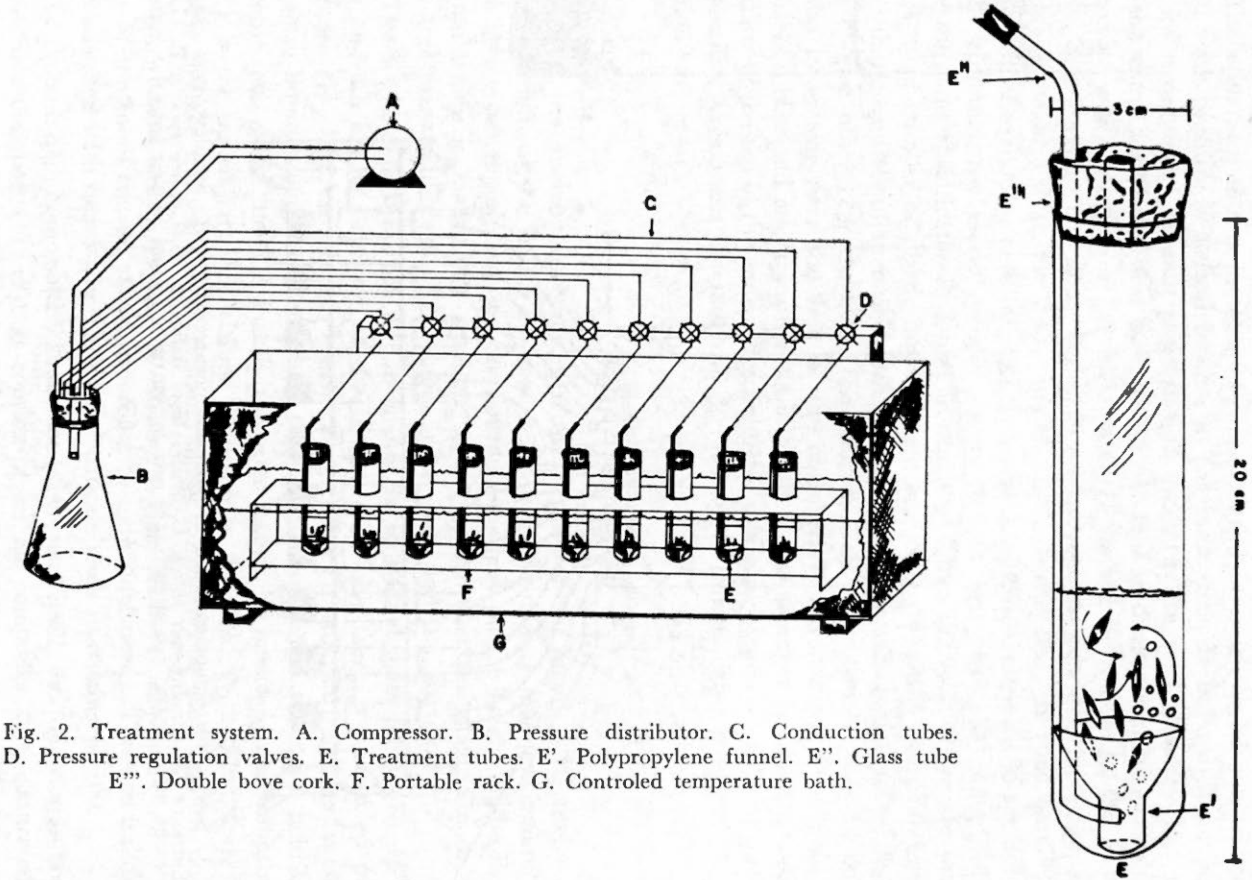

Fig. 2. Treatment system. A. Compressor. B. Pressure distributor. C. Conduction tubes. D. Pressure regulation valves. E. Treatment tubes. E'. Polypropylene funnel. E''. Glass tube E'''. Double bove cork. F. Portable rack. G. Controled temperature bath.

and hoses. The pressure distributor is in turn connected to gas-conduction tubes (C) (as many as necessary) that join to plastic hoses. *Each conduction tube is* provided with a valve (D) for controling the quantity of air in the individual tubes.

The treatment tubes (E) which are placed in a portable rack (F), are assay tubes of an adequate size, 3 cms in diameter and 20 cms long in our case, into which a polypropylene funnel (E') has been placed. The funnel has a hole in the side near the bottom and a notch in the side top part. Fitted to the two openings is a glass tube (E") that is connected to a particular air conduction tube by means of an elastic hose. Because the air distribution system releases the same quantity of air into each conduction tube, and the entrance of air into the treatment tubes is controlled by a valve, then by adequate manipulation, the quantity of air can be made the same for all tubes. Moreover, each treatment tube has a perforated cork (E"') with a notch for clamping the air supply tube and mantaining all of them at the same height. The use of a temperature controlled bath (G) complements the system and assures maximum homogeneity of treatment.

LITERATURE

ABDUL-BAKI, A. A. (1969). Metabolism of barley seed during early hours of germination. Pl. Physiol. *11,* 733-738.

EHRENBERG, L. (1971). Higher plants. In *chemical mutagens*: principles and methods for their detection (A. Hollaender, Ed.). Plenum Press, Nueva York, Vol. 2 pp. 365-386.

GICHNER, T., VELEMNINSKY, J., POKORNY, V. and SVACHULOVA, J. (1972). Influence of post-treatment washing on the mutagenic effects in propyl methanesulfonate and isopropyl-methanesulfonate treated barley seeds. Radiat. Bot. *12,* 221-227.

MIKKELSEN, A. V. and SINAH, F. C. (1961). Germination inhibition in *Oryza sativa.* Crop Sci. *1,* 332-335.

TOMKIN, D. J. and GRANT, W. F. (1972). Comparative cytological effects of the pesticides Mevazon, Metrobromuron and Tetrachloreisophthalonitrile in *Hordeum* and *Tradesscantia,* Can. J. Genet. *14,* 245-256.

YAMAGUCHI, H. (1976). Mutations induced in presoaked barley seeds by diethyl sulfate and 5-Bromodeoxyuridine. Environ. Exper. Bot. *16,* 145- 149.