

THE IMPORTANCE AND EFFICIENCY OF FUMIGATION OF IMPORTED COTTON BALES

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Abstract

Egypt requires double fumigation of imported cotton bales to control phytosanitary regulations of insect introductions, costing the Egyptian textile industry millions of pounds annually. Costly double fumigation and inspectors missions to shipping countries (and their ports of embarkation) appeared to be hard-and-fast requirements that added significant cost to importing cheaper lint.

The present investigation was carried out in El-Wady Kafr El-zayyat Cotton Gin-Plant Co., fumigation was conducted at the Egyptian Cotton Pressing Co., to study the efficiency of fumigation in Egypt to eradicate or suppress the cotton insects and the possibility of carrying out one-time fumigation in Egypt. Two-twin cotton-seed infected by pink bollworm larvae (PBW), *Pectinophora gossypiella* were confined in Nylon-mesh cages and placed in each of different 16 placements in the cotton lint bale. The cages with larvae were placed at 10, 20 and 30 cm. deep in the three dimension of the bale before last pressing. Three bales were prepared in the same technique. One Bale was used as control without fumigation; the second bale was fumigated one time. The third bale was fumigated double or two times, the period between first and the second fumigation is 5 days.

The fumigation process is very important to protect cotton against economic insects introductions. The fumigation in the Egyptian Cotton Pressing Co. is very efficient. One time fumigant process gave the same results of double fumigant. One time vacuum fumigation in the arrival port was Found satisfactory to avoid any insects due to shipment or on bales cover or inside cotton bales replacing the surface fumigation which recommended for food and feed. It is proposed that Phytosanitary regulations should be revised to be in line with international standards, especially with regard to the requirements of double fumigation of imported cotton lint.

INTRODUCTION

One of the major objectives of the Spinning Research Section, Cotton Research Institute, is to solve the problems facing improving cotton industry in Egypt.

Egypt produces about 300,000 tons lint from only Extra Long and Long-Staple cotton varieties, exports about 40% of its production and attempts to consume the rest domestically. Egypt is the only country in the world where the bulk of cotton consumption is from ELS and LS cottons (ICAC - 2005).

The Egyptian textile industry has excuse, because the cotton category, which is suitable to spin into coarse and medium counts i.e. Medium Long Staple "MLS" is not available. In this respect, the Textile Industry Holding Company in Egypt imported Greek and Sudanese MLS cottons to close this gap to produce coarse and medium counts for local consumption.

The short cotton crops of 1999/00 and 2000/01 changed the domestic supply situation, therefore and imports expanded quickly to fill domestic shortfalls. A prime consideration propelling imports was relative prices, however. Egyptian lint is already expensive raw material for domestic spinners, who spin largely low - to medium-count yarn, became relatively more expensive than shorter-staple cotton grown in Greece, Syria, Sudan and the U.S. With such large price differentials, the economic incentive to import cheap foreign lint was too great. The Holding Company became the main importer of first Greek medium-staple cotton in 1999/00, and later Syrian short-staple lint in 2000/01, though one large joint investment spinning company (Misr Amriya) successfully imported Greek lint, and several importers brought in Sudanese Acala. Egypt requires double fumigation of imported cotton bales to protect against insect introductions, costing the Egyptian textile industry millions of pounds annually. Costly double fumigation and travel of Ministry of Agriculture and Land Reclamation "MALR" inspectors to shipping countries (and their ports of embarkation) appeared to be hard-and-fast requirements that add significant cost to importing cheaper lint (Holtzman and Mostafa, 2002).

Methyl bromide (MB) is an essential fumigant for pre-shipment and quarantine disinfestations of post harvest products. The gas is effective within very short exposure periods, typically lasting between 2 and 48 hours. It also airs rapidly enough from treated systems with minimal disruption to normal commercial practices (Chakrabarti, 1996). However, MB emissions were found to have a deleterious effect on the atmosphere, because of which, the parties to the Montreal Protocol decided to phase out its production and use by the year 2005 in industrialized countries and 2015 in developing countries (Donahaye et. al. 2001).

The present investigation was to study the efficiency of fumigation in Egypt to eradicate or suppress the cotton insects and; the possibility of satisfaction of one-time fumigation process in Egypt.

MATERIALS AND METHODS

The present investigation was carried out in El-Wady Kafr El-zayyat Cotton Gin-Plant Co., fumigation was conducted at the Egyptian Cotton Pressing Co., to study the efficiency of fumigation in Egypt to eradicate or suppress the cotton insects and the possibility of using one-time fumigation process in Egypt.

1/4 Kg of two-twin cotton-seed infected by pink bollworm larvae (PBW), *Pectinophora gossypiella* were obtained from the "General administration of Seeds "

the ratio of PBW was about 80%, and confined in Nylon-mesh cages and placed in each of different 16 placements in the cotton lint bale. The cages with larvae were placed at 10, 20 and 30 cm. deep in the three dimensions of the bale before last pressing. Three bales were prepared in the same technique (Figure 1).

Fumigation procedure

One Bale was used as control without fumigation; the second bale was fumigated one time in the steel chamber and the vacuum was (25-27 inches mercury) release fumigant into the chamber (usually through an appropriate heating unit at 15 °C and the dosage was 144g m³ to insure complete non-destructive vaporization of methyl bromide). The exposure time was 3 HRS according to Eppo Standard (1998). The third bale was fumigated double or two times, the period between first and the second fumigation was 5 days.

Gas properties

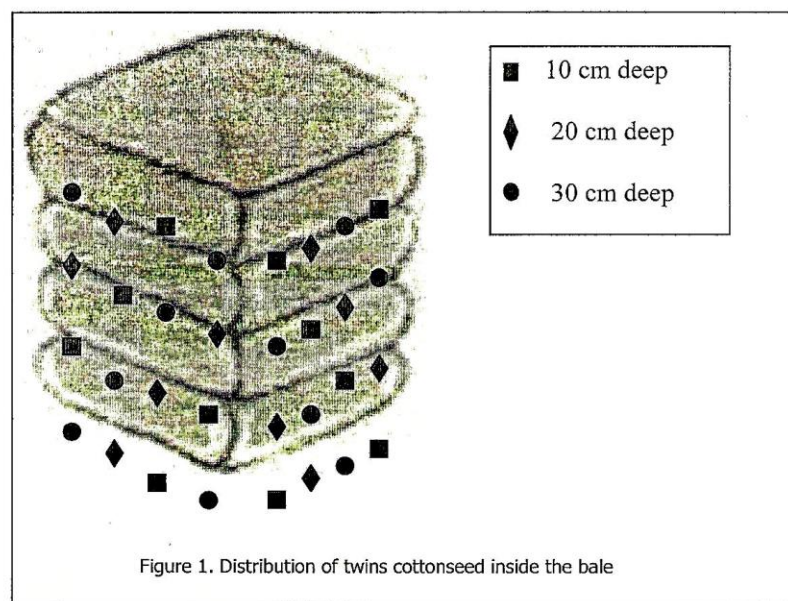
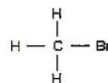
Methyl bromide properties

Chemical name: Methyl bromide

Synonym: Bromomethane

Empirical formula: CH₃Br

Structural formula



Relevant physical and chemical properties

Physical state (atmospheric pressure, 20°C): colorless gas

Boiling-point: 3.56°C

Odor: sickly-sweet or musty

Flash point: non-flammable

Solubility:

Water: 1.37 g/100 ml

Organic solvents: infinitely soluble in alcohol and ether

Specific gravity (liquid): 1.73

Specific gravity (gas): 3.27

Test Insects

The fumigated cotton lint bales were opened and the Nylon-mesh cages brought out. The pink bollworm survival was examined by visual inspection. Mortality counts were made after 1 week of fumigation for PBW larvae,

RESULTS AND DISCUSSION

The cotton bale fumigation procedure carried out in Syria, Greece and Sudan is by surface or vault fumigation, the chamber is to be loaded with the cotton bales to be fumigated. The proper rate of application and exposure time is determined from appropriate table. The fumigant is introduced into the chamber by releasing it into the top of the chamber or container under the supervision of MALR inspectors. According to Methyl bromide properties, especially the specific gravity "liquid or gas", the gas can't penetrate into the bale layers, but can only kill the insects, which maybe, in the bale cover. Also, the chance of Methyl bromide spread in the normal vacuum was very little, and also, this method is only recommended for food and feed etc, EPA registration number 5785-41, 1994.

The first bale

The first bale was not fumigated, but saved in the gin-yard and opened at the same time with the second and the third bales. The mesh cages was collected and inspected to study the potential of pink bollworm to survive. The results showed that the ratios of pink bollworm survival potential were 80% at the different places and depths under study, meaning that the PBW still survive inside the pressed bale.

The second bale

As mentioned before, this bale was given one fumigation treatment. Also, one mesh-çage with infected seed was put in the bale surface. The visual inspection of infected seeds showed that the larvae on the bale surface is dried due to the low vacuum pressure, on the other hand, the mortality counts of PBW larvae is 100%, Table 1 showed the results which reveal the potentials and efficiency of fumigation in Egypt as an effective and rapid disinfestation method.

Table 1. Bale treatments and PBW larvae characters.

Bale treatments		First bale Without fumigation	Second bale One time fumigation	Third bale Double fumigation
Deep inside the bale	Larvae potential	No. of larvae		
10 Cm.	Mortal	14	60	50
	survive	42	0	0
20 Cm.	Mortal	15	65	48
	survive	40	0	0
30 Cm	Mortal	18	44	38
	survive	42	0	0

The third bale

This bale was fumigated twice, the second time after five days of the first bale. The visual inspection of the twin seeds recorded that the mortality of PBW larvae was 100%, meaning that no fertility for the second time fumigation. Therefore, quarantine or fumigation of cotton bales to keep away insects introductions from origin imported cotton country is unnecessary. These results concluded that one time fumigant process gave the same results of double fumigation. One time fumigation under vacuum in the arrival port to avoid existence any insects due to shipment or on bales cover or inside cotton bales is satisfactory. Phytosanitary regulations should be revised to be in line with international standards, with regard to the requirements of double fumigation of imported cotton lint.

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أهمية و كفاءة عملية تبخير بالات القطن المستورد

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تستلزم سلطات الحجر الزراعى فى مصر تبخير بالات القطن المستورد مرتين منعا لسدخول أى حشرات مع بالات القطن الأمر الذى يكلف صناعة الغزل والنسيج ملايين الجنيهات سنويا. فالتبخير مرتين بالإضافة الى تكاليف سفر وإقامة وفود الحجر الزراعى الى الدول الموردة يمثل عبئا و يضيف زيادة معنوية لأسعار القطن المستورد. ولا شك فى أهمية التبخير لمنع دخول أى حشرات أقتصادية يمكن أن تصيب المحاصيل الزراعية بصفة عامة والقطن بصفة خاصة عن طريق القطن المستورد.

أجريت هذه الدراسة فى ملحج شركة الوادى لحليج الأفطان والشركة المصرية المصرية لكبس القطن لدراسة كفاءة التبخير فى مصر ومدى إمكانية الاكتفاء بعملية التبخير لمرة واحدة فى ميناء الوصول. تم وضع كمية من البذور المصابة ببديدان اللوز القرنفلية داخل أكياس مقببة من النايلون ووضعها داخل بالة القطن على مسافات ١٠، ٢٠، و ٣٠ سم من سطح البالة موزعة على ستة عشر موضعا على جميع انحاء البالة قبل الكبس النهائى. وقد تم إعداد ثلاث بالات بنفس الكيفية، البالة الأولى استخدمت كمقارنة بدون أى معاملات وتم وضعها فى فناء الملحج، أما البالة الثانية فقد تم تبخيرها مرة واحدة والبالة الثالثة تم تبخيرها مرتان وكانت الفترة الزمنية بين التبخير الأول والثانى بالنسبة للبالة الثانية خمسة أيام.

أوضحت النتائج أن التبخير فى ميخرة الشركة المصرية لكبس القطن يتم بكفاءة عالية، والنتائج أوضحت أن التبخير لمرة واحدة أعطى نفس نتائج عملية التبخير على مرتين. ولتفادى دخول أى حشرات تكون قد علقّت بغطاء البالات من الخارج أثناء عمليات الشحن البحرى توصى الدراسة بالإكتفاء بالتبخير مرة واحدة فقط فى ميناء الوصول، على أن يتم التبخير تحت ضغط وليس تبخير سطحى لأنه غير موصى به بالنسبة للقطن الشعر ومخلفاته طبقا لما أوردته وكالة وقاية البيئة الأمريكية مع ضرورة مراجعة إجراءات الحجر الزراعى الخاصة بإستيراد القطن لتتوافق مع القواعد الدولية وعلى وجه الخصوص بالنسبة للتبخير المزدوج و الإكتفاء بالتبخير مرة واحدة فى ميناء الوصول.