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## A study on infestation of eco Holi colors stored In Hermetic bag

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### Abstract

An infestation is an invasion of insects on a place like a house or food products or powder forms. An attack by insects on a product that damages the quantity, quality and performance of a product. Hermetic bags can prevent excessive insect infestation, and toxin formation. The study resulted that the orange and yellow color in control bag did not maintain the moisture content. This states that moisture content of colors was maintained in hermetic bag when compared to normal plastic bag. Hermetic bag was more suitable for pink, blue, orange and green colors for long storage duration. Hermetic storage also prevents the reabsorption of moisture from the atmosphere. Re-absorption of moisture can deteriorate stored grains as it encourages mold growth which can lead to aflatoxin contamination. As the use of hermetic bags is a good intervention for preventing storage loss, it is best promoted not only for providing direct profits to farmers but also for health benefits, as bag use implies a lower need for pesticides and a possible reduction in aflatoxin intake.

**Keywords:** Eco Holi colors, color infestation, storage, hermetic bag, insects, moisture content

### Introduction

The festival of colors, fun, joy and harmony is known as Holi in India. It is celebrated by spreading scented colors, fun, joy and harmony is known as Holi in India. It is celebrated by spreading scented colors, powders and perfume at each other. The various parts of trees such as flowers, leaves, fruits and so on, from Indian coral tree (Parijat), flame of forest (Kesu), marigold, turmeric (Haldi), henna (Mahendi), and beetroot etc has been used to prepare colors. Ancient India was fully responsive to utilize the natural aromatics & ecofriendly colors taken from Nature. They trust on its benefits for our skin, health and also there therapeutic value. The ingredients of Gulal were purposely chosen for their vital qualities. In Vrindavan, Holi is still played with actual flower petals chosen for their fragrance and colors such as rajnigandha, rose, marigold, jasmine etc. By using these safe, natural & eco-friendly colors we can save our environment and conserve our biodiversity. It is to be noted that Holi can be more soothing by celebrating with the natural and eco-friendly colors. As natural colors are obtained from skin friendly resources such as turmeric (Haldi), flower extracts, sandal wood powder, mehndi (Henna) etc.

Buying synthetic dyes used in the holi colours from the market contain harmful chemicals, which can cause mild health problems ranging from allergies, itchiness, eye puffiness, giddiness to serious issues like blindness, renal failure, cancer, etc. When we wash ourselves after playing with these toxic colors, these chemicals get into the environment and contaminate the soil and ground water, and spoil the natural habitat. It is very essential to habituate the use of eco-friendly colors for the benefit of human and environment too. Thus, Eco-friendly colors were preferred by most of the people but its packing and storage was high risk method. As they are made naturally from flowers and leaves the retention of moisture content in color might be less. Due to the moisture content present in color, few pest and insects might infect the color. Thus, hermetic bag was used to store the Eco holi colors and regular color infestation was performed.

### Reviews

Chigoverah *et al.* (2014) [5] worked on effect of hermetic facilities on stored maize insect infestation and grain quality. The results show that pesticide-free hermetic storage facilities can be used to reduce storage losses. The experiment was set in a completely randomized design consisting of three replicates of four treatments namely: hermetic metal silo, hermetic grain bag, polypropylene bags with and without synthetic pesticide.

The last two served as positive and negative controls, respectively. For each set of treatments, there were two modes of infestation: natural and artificial. Hermetic facilities can effectively suppress insect development and consequently reduce losses and maintain seed viability during storage without use of pesticides. The hermetic technologies can be an effective grain protection alternative that enhances the livelihood of smallholder farmers. Bailey and Banks (1980) [1] stated that hermetic condition delayed insect development, impaired metamorphosis and altered fecundity.

Cotton and Winburn (1941) [7] worked on Field Infestation of Wheat by Insects Attacking it in Farm Storage. The samples of wheat were stored for several months for the possible emergence of insects. They were examined in September and October and recorded all the insects found it is shown that in the winter month count of insects high than in summer season due to the high moisture content.

Mutambuki and Likhayo (2021) [2] performed a test of six grain storage technologies for the control of insect pests in maize was evaluated over a 36-week (9-month) storage period. The six technologies used were: two Zero Fly hermetic bag brands (laminated and non-laminated); Purdue Improved Crop Storage (PICS) bag; non-hermetic ZeroFly bag; woven polypropylene (PP) bag containing maize grain treated with Actellic Gold Dust (pirimiphos-methyl 1.6% + thiamethoxam 0.3%) and woven PP bag containing untreated grain. Each bag was filled with 50 kg maize grain and four replicates of each were set up. Based on the evaluation results, it can be concluded that hermetic PICS and Zero Fly bags and woven PP bag with Actellic Gold dust-treated grain effectively protected stored maize grain from insect attack and weight losses. Appropriate strategies and mechanisms for the effective and efficient adoption of hermetic storage bag technology at scale would contribute towards global food security.

Munro (1933) [8] studied on Infestation of Stored Products by Insects. The losses caused to growing crops by insects have long been recognised, the losses caused to crops after

harvesting and during storage and transport have been strangely neglected both by the biologist and the industrialist. It is high is evident from the almost extravagant care which our food industries take to prevent any knowledge of infestation from reaching the general public.

### Methodology

**Research Design:** Experimental Research Design was adopted to conduct the study.

**Procedure:** Holi Eco-friendly five colors were taken for the study. Each color was stored in both control and experiment bag for 9 months period. For every 2-3 months visual inspection was carried out to check the color infestation.

**Selection of tool:** The visual inspection was done for assessing the infestation.

**Data analysis:** Results obtained for control and experiment bag was noted and interpretation was done.

### Results and Discussion

Temperature and moisture conditions of storage areas are usually favorable to insects. However, if the color later brought to a higher temperature, development will usually go on decreasing. Normally few insects will develop at temperatures higher than 100°, most insects will die in a temperature of 120° in a few hours. Moisture affects insects in much the same way that temperature does. Too much or too little prevents their development; ordinary amounts produce the most rapid development.

Performed visual inspection to check the infestation of colors. Infestation is usually referred as the presence of an unusually more number of insects typically so as to cause damage or overrun something in large number that they are difficult to control. Level of infestation reveals the performance and efficiency of control and experiment bag.

**Table 1:** Infestation of colors stored in control and experiment bag

Natural/Eco Holi Colors		Yellow	Pink	Blue	Orange	Green
Control	Infestation at 3 months of storage period	*Found	Nil	Nil	Nil	Nil
Experi-ment		Nil	Nil	Nil	Nil	Nil
Control	Infestation at 6 months of storage period	*Found severely	Nil	Nil	**Found Few insects	Nil
Experi-ment		*Found very mild	Nil	Nil	Nil	Nil
Control	Infestation at 9 months of storage period	*Found severely	Nil	Nil	**Found severely	Nil
Experi-ment		*Found very mild	Nil	Nil	Nil	Nil
*Storage pest - Lasioderma/ cigarette beetle was found in Yellow colour						
** Storage pest - Tribolium/ red rustic beetle and fungus was found in Orange colour						

Visual observation was done in both control and hermetic bags of 5 Holi colors at different stages. In the experiment bag among 5 colors only yellow color found to be very mildly infested after 6 months compared to control bag which was infested early at 3 months of storage. Orange in control bag started infestation at 3 months, whereas experimental bag was not infested at all. In the control and experiment bags, pink and blue colors were not infested but change in colour variation was found with regard to experimental group. Yellow and orange color in control bag found to be highly infested by Lasioderma/ cigarette beetle (Yellow colour) and Tribolium/ red rustic beetle and fungus (Orange colour) at 9 months of storage period. From the above table. 1. It was

concluded that orange and yellow color in control bag did not maintain the moisture content. This states that moisture content of colors was maintained in hermetic bag when compared to normal plastic bag. Hermetic bag was more suitable for pink, blue, orange and green colors for long storage duration.

### Conclusion

From the above study it was concluded that orange and yellow color in control bag did not maintain the moisture content. This states that moisture content of colors was maintained in hermetic bag when compared to normal plastic bag. Hermetic bag was more suitable for pink, blue, orange

and green colors for long storage duration. Hermetic storage also prevents the reabsorption of moisture from the atmosphere. Re-absorption of moisture can deteriorate stored grains as it encourages mold growth which can lead to aflatoxin contamination.

## References

1. Bailey SW, Banks HJ. A review of recent studies of the effects of controlled atmospheres on stored product pests; c1980. p. 101-118.
2. Mutambuki K, Likhayo P. Efficacy of different hermetic bag storage technologies against insect pests and aflatoxin incidence in stored maize grain. *Bull Entomol Res.* 2021;111(4):499-510.
3. Boom MP, Spoelstra K, Biere A. Pollination and fruit infestation under artificial light at night: light colour matters. *Sci Rep.* 2020;10:18389.  
<https://doi.org/10.1038/s41598-020-75471-1>
4. <https://doi.org/10.1038/s41598-020-75471-1>
5. Chigoverah AA, Mvumi BM, Kebede AT, Tefera T. Effect of hermetic facilities on stored maize insect infestation and grain quality; c2014.  
DOI: 10.14455/DOA.res.2014.62
6. Sule Keskin, Hazim Ozkaya. Effect of storage and insect infestation on the technological properties of wheat, *CyTA - Journal of Food.* 2015;13(1):134-139.  
DOI: 10.1080/19476337.2014.919962
7. Cotton RT, Winburn TF. Field Infestation of Wheat by Insects Attacking It in Farm Storage. *Journal of the Kansas Entomological Society.* 1941;14(1):12-16.  
<http://www.jstor.org/stable/25081617>
8. Munro J. Infestation of Stored Products by Insects. *Nature.* 1933;131:82-84.  
<https://doi.org/10.1038/131082a0>