IEEE Paper
Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
Organized by Phaltan Education Society's College of Engineering Phaltan, www.coephaltan.edu.in
International Journal of Innovations in Engineering Research and Technology [IJIERT]
ISSN: 2394-3696, Website: www.ijiert.org, July, 2023

# Development and Fabrication of Onion Storage Unit

Rohit Dhotre, Swapnil Mashalkar, Mukesh Natikar, Nikhil Pawar, Nikhil Shinde
*Dr.S.S.Wangikar SVERI's COE Pandhapur*

## 1. Introduction

Onion (Allium cepa L.) is one of the most popular vegetables that form the daily diet, consumed in various forms, and it is an important commercial crop that is widely grown in different parts of the world. In Iraq, onion is considered one of the most important vegetable fruit crops.

World onion production is estimated at approximately 105 billion pounds each year. The average annual onion consumption calculates to approximately 13.67 pounds of onions per person across the world. Libya has the highest consumption of onions with an astounding average per capitaconsumption of 66.8 pounds. Per capita onion consumption has risen over 70%in the last two decades, from 12.2 pounds per person in 1982 to just over 20 pounds per person in 2018. In the past decade, red onions have gained popularity, especially in fast casual dining segments on pizza, sandwiches and salads.

India is the second-largest onion-growing country in the world. The Indian onions are famous for their pungency and are available around the year. Indian onions have two crop cycles, the first harvesting starts from November to January and the second harvesting from January to May. The major onion-producing states are Maharashtra, Karnataka, Madhya Pradesh, Gujarat, Bihar, Andhra Pradesh, Rajasthan, Haryana and Telangana. Maharashtra ranks first in onion production with a share of 39% followed by Madhya Pradesh with a share of 17% in 2020-21.

## 2. Abstract

Due to the inadequate capacity of onion storage in our country, we must build storage structures at the farmer's level. This article is a small effort in that direction. Various types of onion storage structures discussed in this article are summarized from various sources and scientists. India is a region that depends on the agricultural sector. As per the report of the Financial Express in 2018, the contribution of the agriculture sector to GDP is 17–18%. Also, it provides employment to nearly 50% of the population. Despite all these facts, farmers are facing many problems on the fronts of infrastructure and technology. There are many prospects in the agronomy field for the implementation of technologies to store the last amount of onion in good condition. So, it requires a proper storage system. Various researchers are working in this area to develop designs and fabrications that are adoptable by farmers. Proper onion storage gives good results in the long term. This article reviews the proposed technologies and modifications made to them by various technocrats and researchers in the onion storage systems. This design of storage systems gives better results in the good condition of the onions, which gives better results in the quality of the onions.

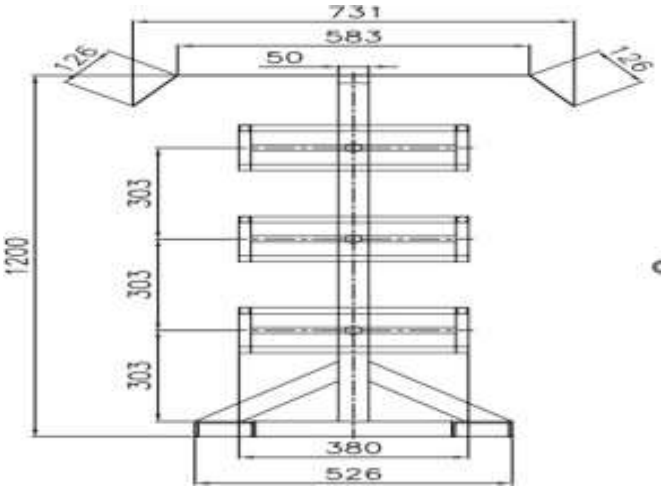
## 3.Methods

These are some onion storage structures name

- Traditional double row storage structure
- Modified bottom ventilated storage structure
- Top and bottom ventilated storage structure with mud-plastered walls
- Modified bottom ventilated storage structure with chain-linked sidewalls
- Traditional single row storage structure
- Modified bottom ventilated single row storage structure

## 4. Development of Onion Storage Unit Model using CATIA Software

The system modeling done in the CATIA software. This is a front view of the model which highlights the parts like the handle, base, top cover, tray, and column are indicated. It is depicting the front view and side view of the schematic for the Onion storage unit




Side View

Fig. 4.7- schematic for the Onion storage unit

**Parts of the onion storage unit**

1) handle 2) Base 3) Side Support 4) Basket 5) Canopy

6) Nut & Bolt

Fig 4.8: - Developed model of the onion storage unit using CATIA software

## 5. Result and Discussion

The performance analysis of the fabricated Onion Storage Unit is analysed using three parameters

1. Temperatures of the onion
2. Weight of the onion
3. Overall quality of the onion

1.Temperatures of the onion

| Days | Internal Temp (°C) | Outer Temp (°C) |
|---|---|---|
| 1 | 27 | 27 |
| 2 | 27.1 | 27.1 |
| 3 | 26.9 | 27 |
| 4 | 26.8 | 27.1 |
| 5 | 26.9 | 27.2 |
| 6 | 26.7 | 27.1 |
| 7 | 26.3 | 27.9 |
| 8 | 26.1 | 27.8 |
| 9 | 25.7 | 28 |
| 10 | 25.9 | 28.1 |
| 11 | 26.1 | 28.4 |
| 12 | 26.4 | 28.4 |
| 13 | 26 | 27.9 |
| 14 | 26.2 | 28.1 |
| 15 | 26.4 | 28.3 |
| 16 | 26.4 | 28.1 |
| 17 | 26.5 | 28.9 |
| 18 | 26.3 | 28.3 |
| 19 | 26.9 | 28.7 |
| 20 | 26.4 | 28.9 |

Table 3: - Temperature Reading of the Onion

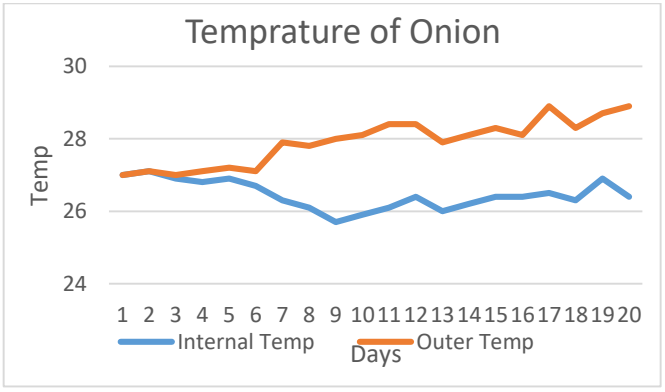



Fig 6.1: - Chart of the temperature of onion

Fig : - Chart of the temperature of onion

## 2.Weight of the onion

The Weight calculation of the onion is presented below in Table. The internal weight represents weight for the onions stored in the fabricated storage unit while the external weight represents the weights of onions stored by traditional way.

Table: Weight calculation of the onion

| No of days | Internal Weight (KG) | External Weight (KG) |
|---|---|---|
| 1 | 30 | 30 |
| 4 | 29.95 | 29.9 |
| 8 | 29.9 | 29.83 |
| 12 | 29.88 | 29.81 |
| 16 | 29.85 | 29.75 |
| 20 | 29.83 | 29.71 |

## 6.Comparison of the overall quality of onion

**The inner side of the onion**

**Day 1st**

**The outer side of the onion**

**Day 1**

**Day 20**

**Day 20**

The day-to-day comparison of the onion is below tables**.** The inner side onion represents onions stored in the fabricated storage unit while the outer side of the onion represents the onions stored by traditional way.

## 7.The temperature Reading:

Temp Reading of the Onion is presented below. The Internal temp represent temperature for the onions stored in the fabricated storage unit while the outer temperature represents the temperature of onions stored by traditional Method

## 8.Future scope

- There is good scope to develop large-scale storage units that may be used throughout the year for different products to make them attractive to farmers.
- The performance of the existing onion storage system can still be improved upon especially in the aspect of reducing the humidity in the unit, increasing the capacity of onion and reducing the temperature.

## 9.Conclusion

The Onion Storage Unit is developed using CATIA software and further fabricated. Based on the analysis, the performance of the developed Onion Storage Unit is predicted.

- The temperature of the onions stored in onion storage unit is observed to be lesser as that compared with onions stored in traditional way.
- The less weight loss is observed for the onions stored in storage unit as compared with onions stored in traditional way.
- The overall quality for the onions stored in storage unit is noted to be better as compared with onions stored in traditional ways.
- The developed and fabricated Onion Storage Unit is unique, compact and Portable.

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