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Next FOOD

European FooD-STA ISEKI Food Association

ICC INTERNATIONAL ASSOCIATION FOR CEREAL SCIENCE AND TECHNOLOGY

AHDB AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

# KinwaPak

## A sustainable active packaging

# KinwaPak Team

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# Background

1.3 BI TONNES WASTED*

OF WHICH

40%

AND

30%

BELONGS TO:

IN TERMS OF THE FOOD SUPPLY CHAIN

40%

OF THE WASTE IS OBSERVED DURING:

IN DEVELOPING COUNTRIES


IN DEVELOPED COUNTRIES

FF4US PROPOSAL

86.7 MI TONNES WASTED**

41%

19%

19%

QUINOA BY-PRODUCTS FROM

HARVESTING

PLANT WASTE

INDUSTRY

SAPONIN-RICH DUST

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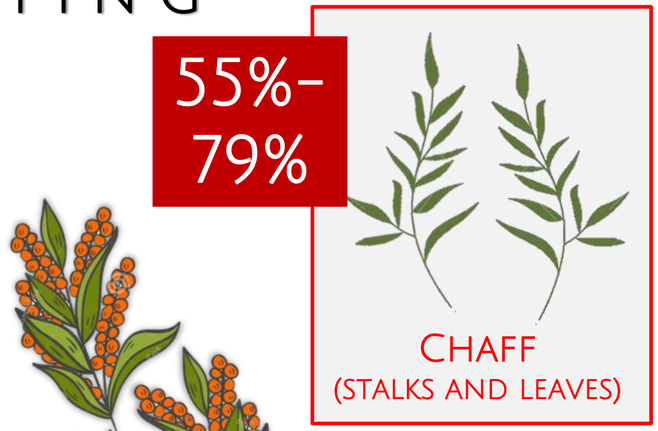
*Per year (FAO, 2020)

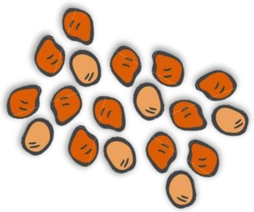
**In 2016 (Eurostat, 2019)

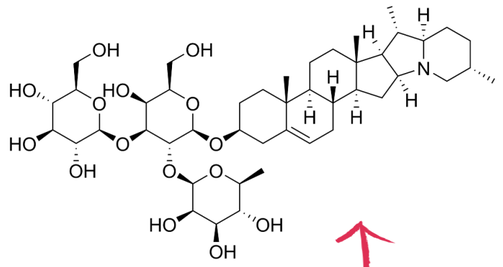
# HARVESTING

55%-79%



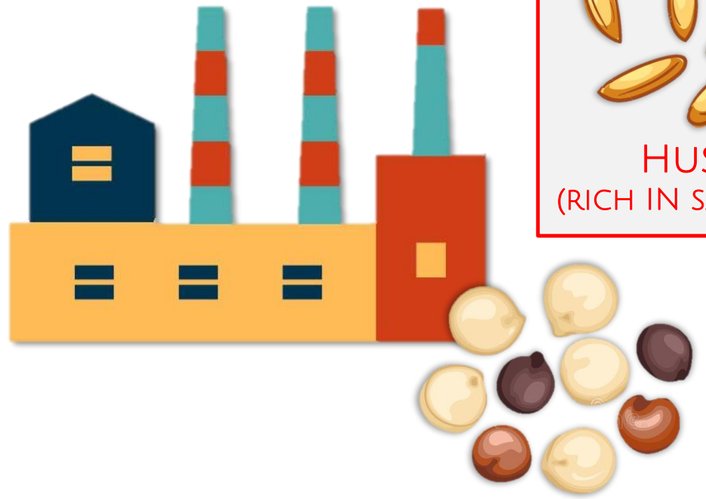
CHAFF
(STALKS AND LEAVES)





8%-12%

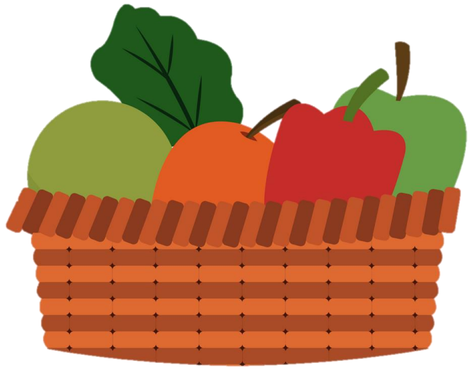
HUSKS
(RICH IN SAPONINS)



DURING SEED HARVESTING, YIELD CAN RANGE FROM 500 TO 1,000 KG PER HECTARE WHEREIN APPROXIMATELY 5 TO 10 TONS ARE THE CHAFF (STALKS AND LEAVES) PER HECTARE

# LOGISTICS

# PROCESSING



## FRUITS & VEGETABLES

- ✓ Perishable goods
- ✓ Short shelf-life

**45%**

are lost or wasted

## LATIN AMERICA

**55%**

## FRUITS & VEGETABLES

are lost or wasted at different stages of the food supply chain*

*FAO (2016)

**20%**

Losses due to **SPOILAGE**

## MAIN SOURCE

- ✓ Bacteria
- ✓ Moulds

## AVOCADO

466.76 k tn in 2017**

## CAPE GOOSEBERRY

523.8 k tn in 2020***

***Ministry of Economy and Finance of Peru, (2016)

**The Peruvian Chamber of Commerce (2019)

# MAIN OBJECTIVES

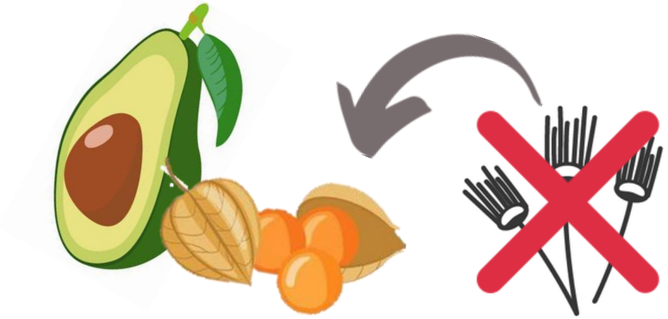
STALKS AND LEAVES

SAPONIN-RICH DUST

SUSTAINABLE ANTIFUNGAL PACKAGING

ADDED VALUE TO PLANT

HIGHER REVENUE FOR FARMERS



IMPROVE STORAGE CONDITIONS FOR SPOILAGE-SENSITIVE PRODUCTS

# Proposal of solution
# Manufacturing of the packaging

## Pulping*

Digestion of **stalks and leaves** using an alkaline process.

## Blending**

Mixing of pulp, **saponins-rich dust** and water.

## Moulding**

Deposit of pulp on the outer surface of the die. The pulp is accumulated to a desired thickness. The mechanically bounded water is removed by vacuum

## Drying**

Application of heat in between the surfaces. This process increases the bonding between fibers, improving the mechanical properties.

## Assembly**

Junction of the sheets and build up of a box of any desired dimensions.

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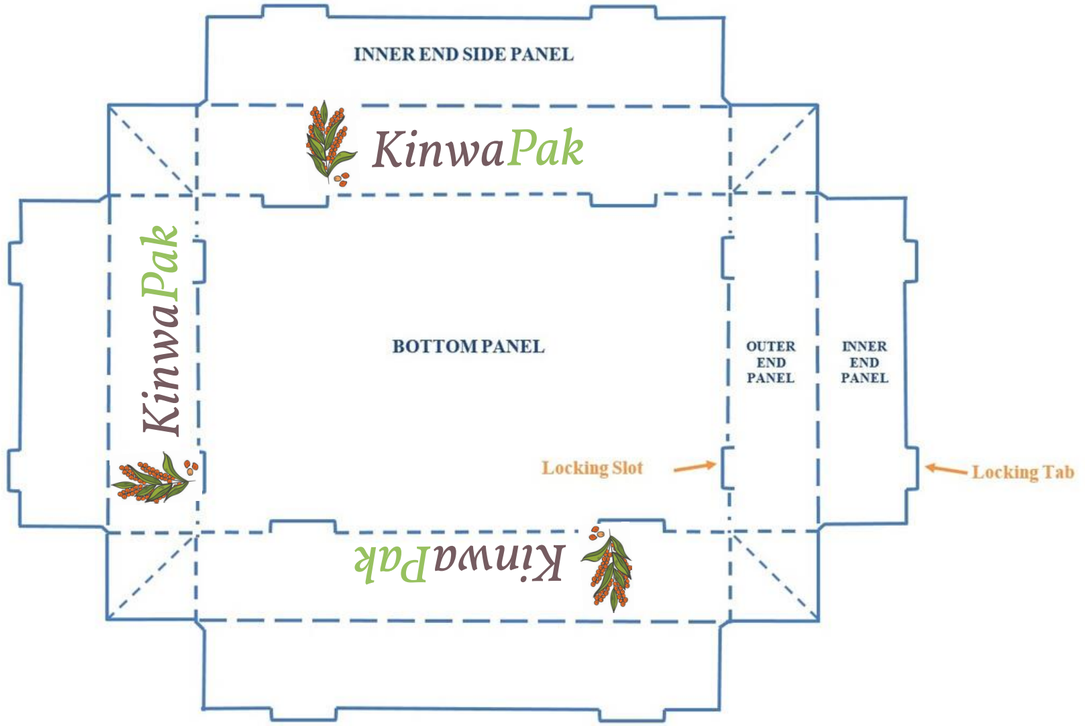
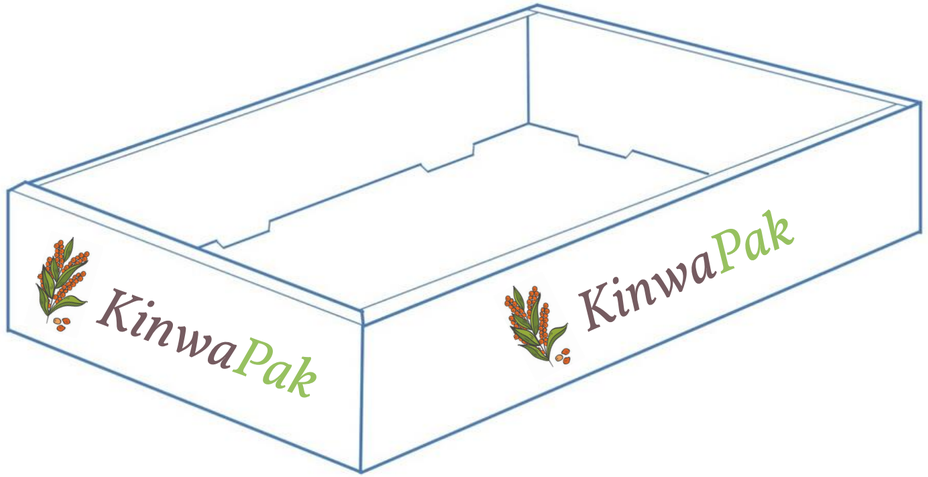
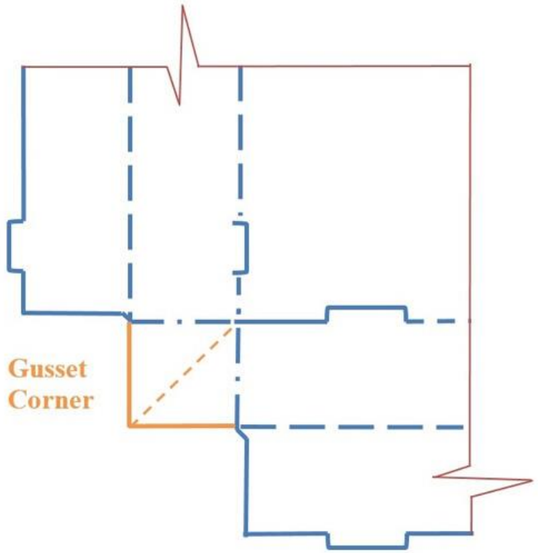
*Liu et.al. 2018

**Didone et. al. 2017

# FINAL PROTOTYPE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# FINANCIAL ANALYSIS

Considering a box of 200 grams with dimensions of 27 cm x 34.8 cm x 9.9 cm

| Material description | Quantity | Unit cost (USD/ton) | Cost (USD/ton) |
|---|---|---|---|
| Pulp from quinoa waste | 95.75% | 350 | 335.128 |
| Saponin-rich dust | 2.65% | 2000 | 52.985 |
| Chemicals and reagents* | 1.60% | 0.83 | 0.013 |
| Utilities* | | | 364.900 |
| Fixed cost* | | | 530.956 |

**$0.26**

*Esmieo et. al. (2018)

# ECONOMIC VALUE FOR FARMERS

**95,000 tonnes**

QUINOA PRODUCED IN PERU (2019)*

55%**

**116,111 tonnes**

PLANT WASTE

**10%**

MARKET SHARE

**350 USD/ton**

80%

**280 USD/ton**

FOR THE FARMER

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*Ministry of Agriculture and Irrigation of Peru, 2019

**Maliro et. al., 2017

# $3,251,111

Yearly profit for Peruvian farmers

# CONCLUSION

Facing the recent concerns related to **sustainability** in the cereal supply chain, this project has identified a great **potential to reduce food and packaging waste**. It provides a **feasible** alternative for a packaging, which **valorises** the by-products from **quinoa** harvesting and processing.

# RECOMMENDATIONS

- Elaborate a **lab-scale** packaging **prototype** and compare its physical properties to those of a regular cardboard box;
- Evaluate the efficiency of the packaging regarding its **antimicrobial activity**;
- Perform a **highly-detailed** feasibility and market study in order to **expand the application** of the packaging to other products.

# References


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# THANK YOU!

¡GRACIAS!

OBRIGADO!

SALAMAT!

Q&A TIME

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