13th ANNUAL FULBRIGHT & HUMPHREY ALUMNI CONFERENCE
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AGENTS OF CHANGE
FULBRIGHT AND HUMPHREY ALUMNI

Implementing Climate-smart Dry Chain Technology for Seed and Food Security in Pakistan

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UCDAVIS
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Pakistan Seed
Promotion Alliance

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PAKISTAN - US ALUMNI NETWORK

SAP SEED ASSOCIATION OF PAKISTAN

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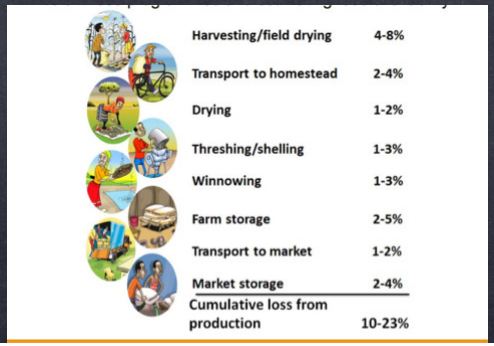
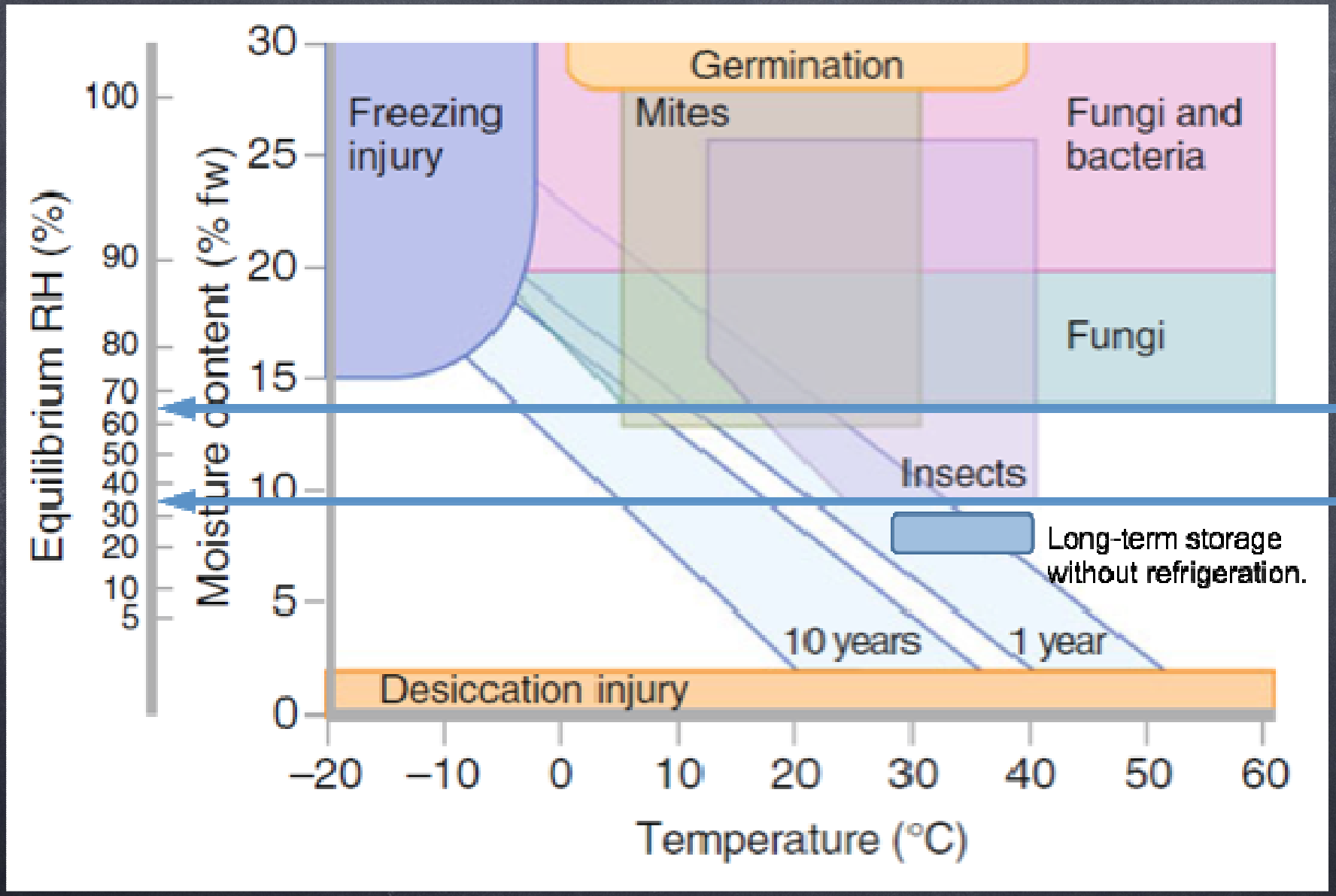
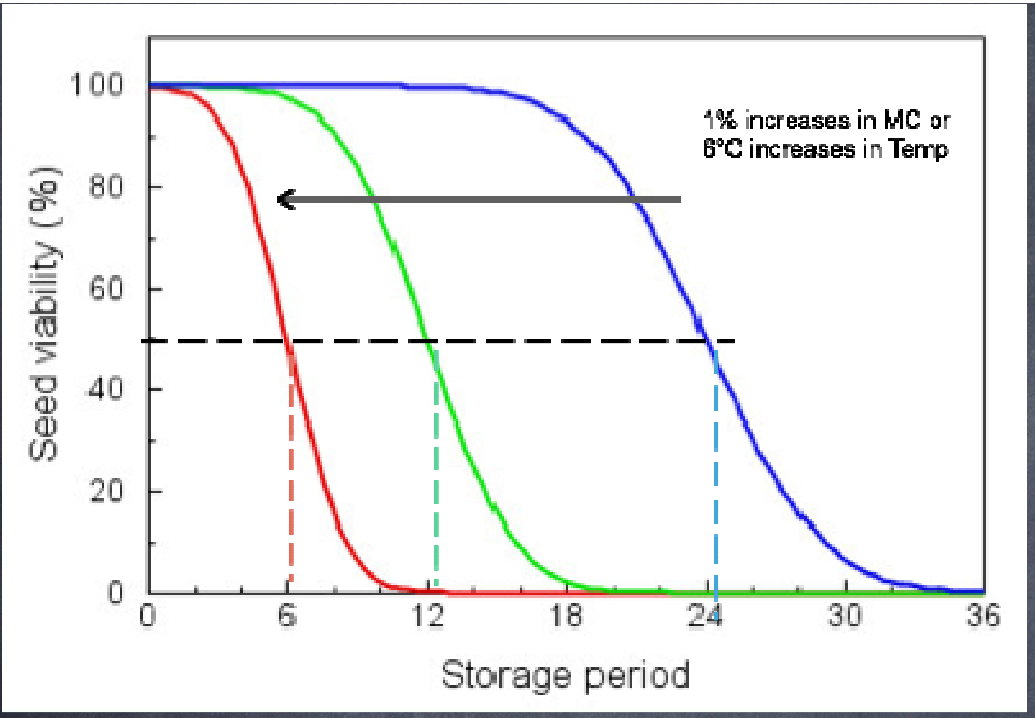
Problems???

- 1.3 billion metic tons of food is lost per year
- About 80 million tons of food grains are damaged by molds and insects
- Over 4.5 billion people are chronically exposed to aflatoxin in their diets
- Pakistan's economy loses PKR 6 to 7 billion per year because of the lack of adequate storage



Correct drying and storage can play a major role in the reduction of insect infestation and seed loss





James' Rule:
Temp (ºF) + RH (%) < 100
(for adequate, not optimal storage)

Harrington's Rule:
Seed longevity decreases by one-half for every 1% increase in moisture content or every 10ºF (6ºC) increase in temperature.

Our Strategy is to reduce SMC

University

USAID

Implementing Dry Chain Technology for Improving Livelihoods of The Maize Farming Community in Pakistan




IRFAN AFZAL
Associate Professor

Kent J. Bradford
Distinguished Professor

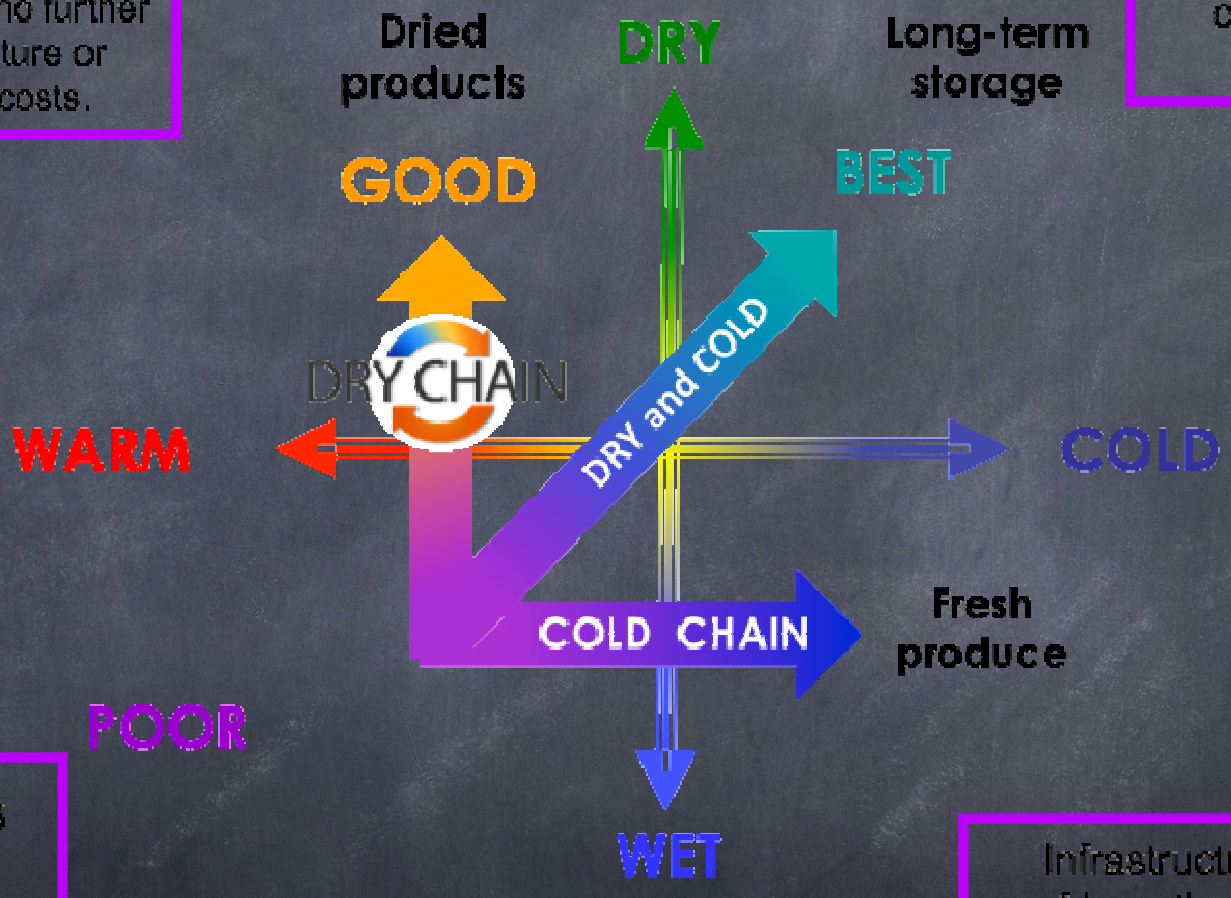
Shazma Anwar
Assistant Professor

Gulraiz Ahmed

Cold and Dry Chains for Fresh and Dried Products

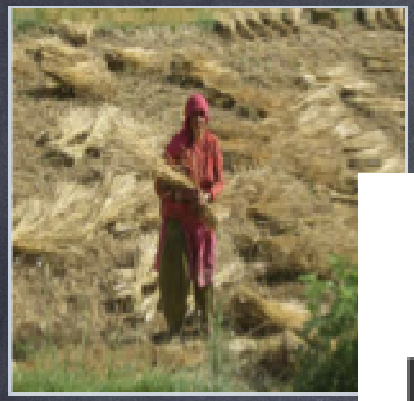
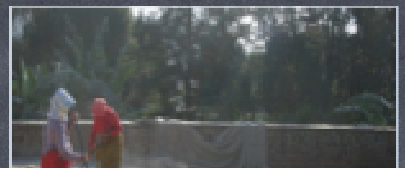
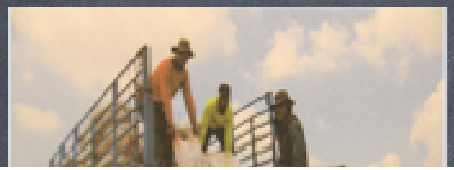
Once dry and packaged, no further infrastructure or energy costs.

Excellent for seeds or germplasm storage.



Most foods begin wet and warm

Infrastructure, refrigeration and energy costs.

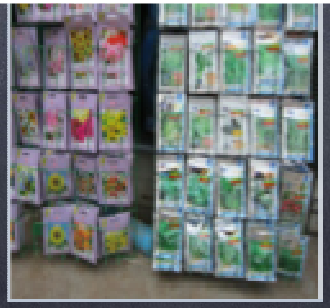




DRY CHAIN

Harvest

Make It Dry – Keep It Dry





"Dry Chain" Concept for Seeds and Dried Commodities

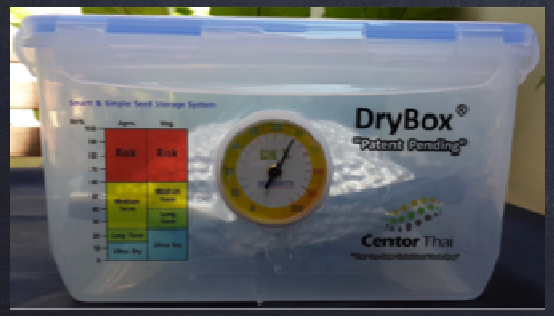
Improvements in traditional drying and storage

Hermetic sealed storage system

- Special plastic-low oxygen permeability
- Respiration of grains and insect activity reduce oxygen quickly
- Plastic prevents moisture

1. Place the Super bag as a liner inside an existing storage bag

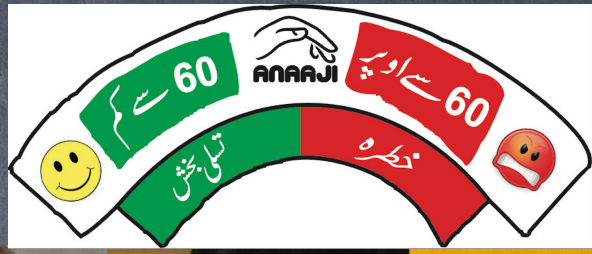
2. Fill bag with dry grain or seed
3. Remove excess air and twist



4. Fold plastic over and seal with either strong rubber bands or tape.

Hermetically Sealed drum (200 L)

ANAAJI

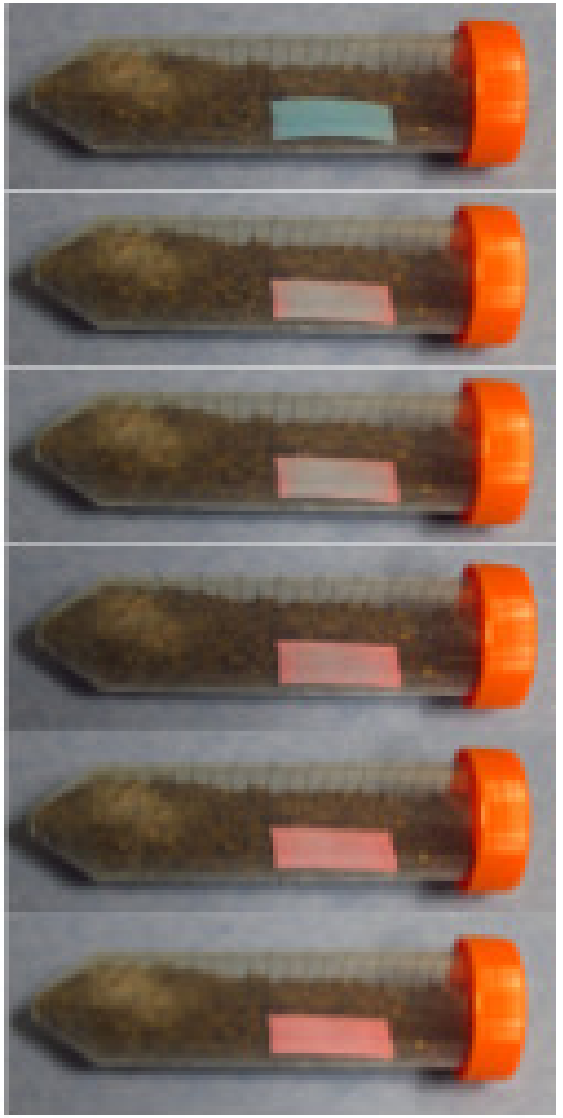


RH Indicator Strips Are Cheap and Easy to Use

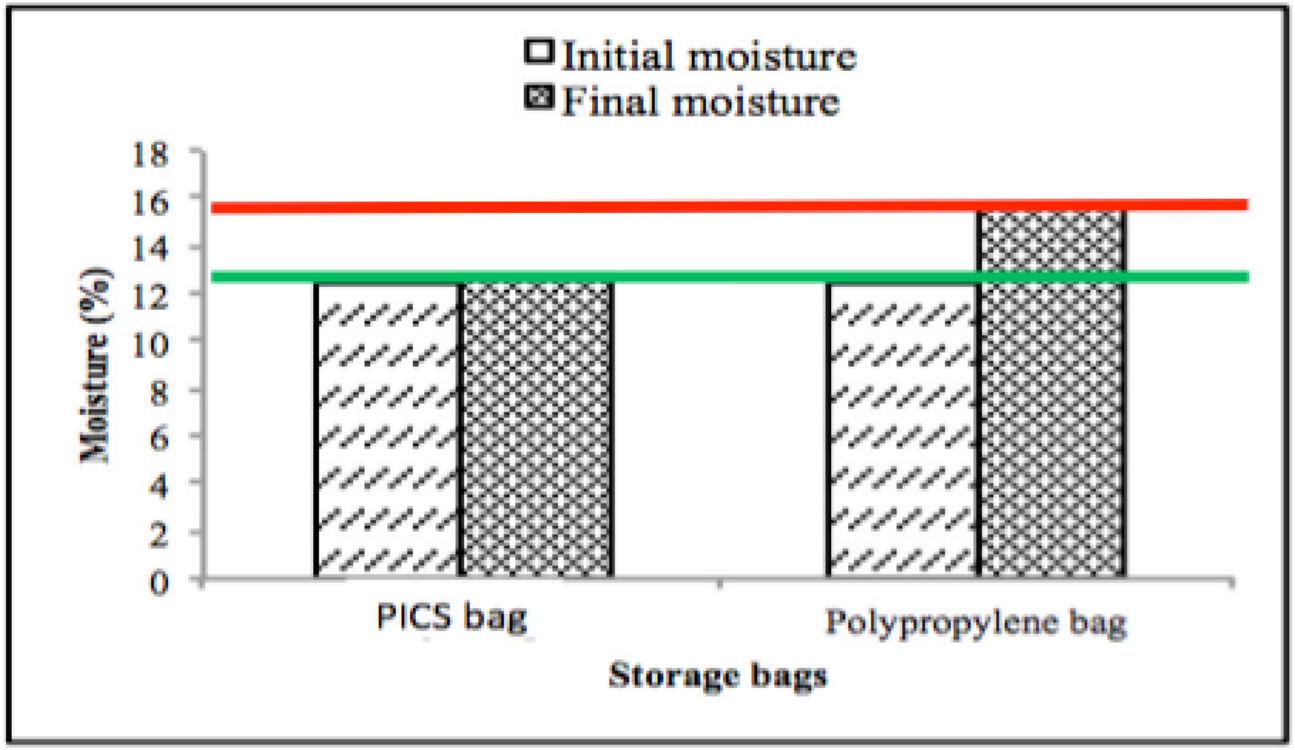
- RH indicator strips are very inexpensive and are adequate for routine monitoring.
- They can be enclosed in a sealed container with a seed sample, allowed to equilibrate, and the RH inside the container can be read on the color scale.

www.microessentiallab.com

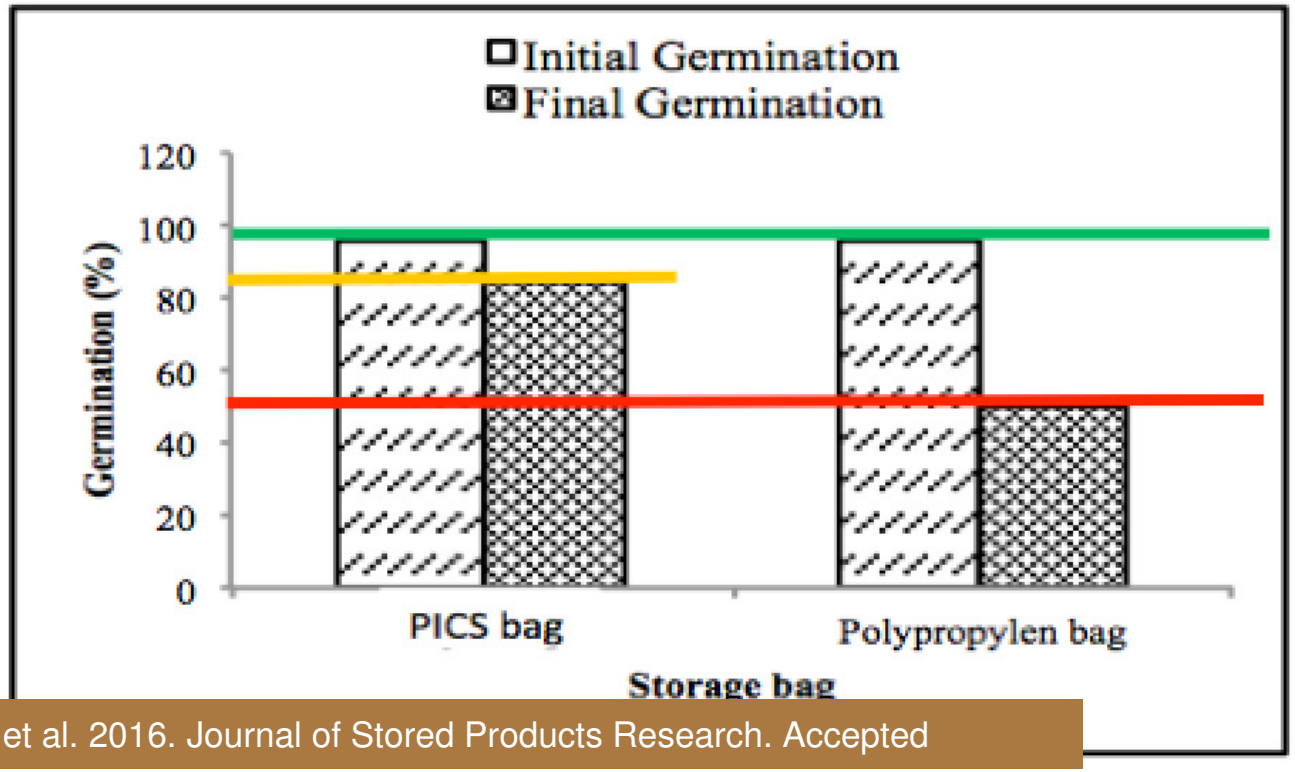
RH indicator strip added to sample of high MC seeds



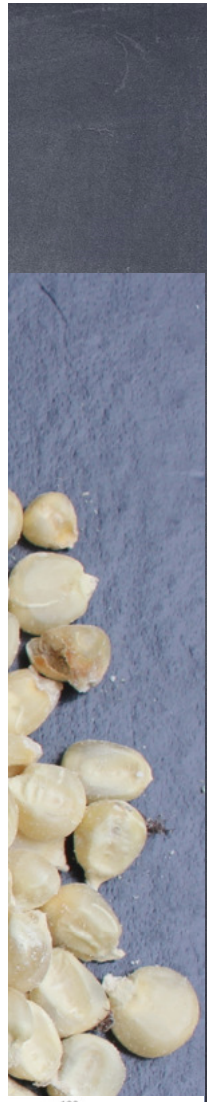
Maize

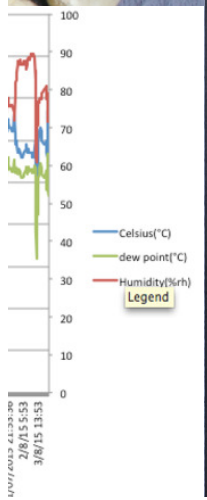


+ 3% MC



- 45% Germ





Afzal et al. 2016. Journal of Stored Products Research. Accepted

Working with FAO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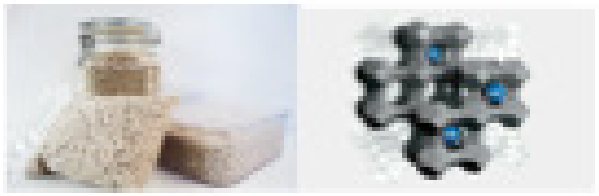
Post harvest handling:

Cotton

Dry Chain Principle



Drying beads®

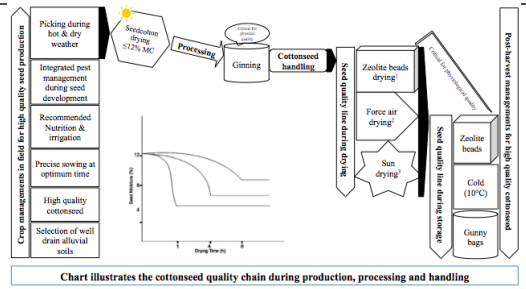


Chart illustrates the cottonseed quality chain during production, processing and handling

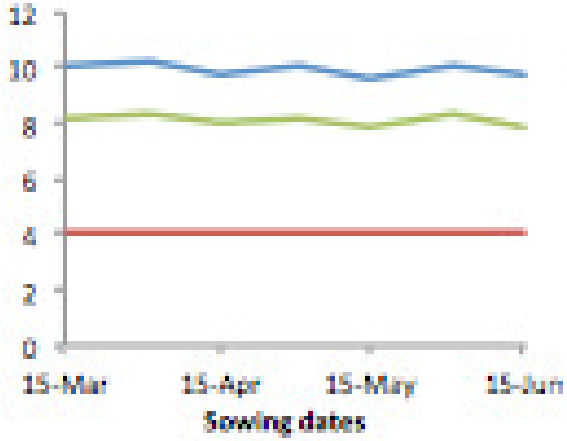


Fig g: Sun drying

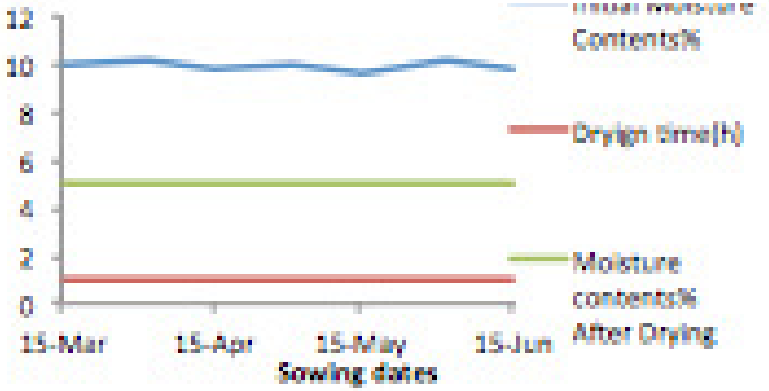


Fig h: Drying beads Drying

Sun dried the cottonseed from 9.90% to 8.11% in 4 h while Drying beads when hermetically packed with cottonseed with 9.7% SMC dried down seeds to 5% SMC in 1 h.

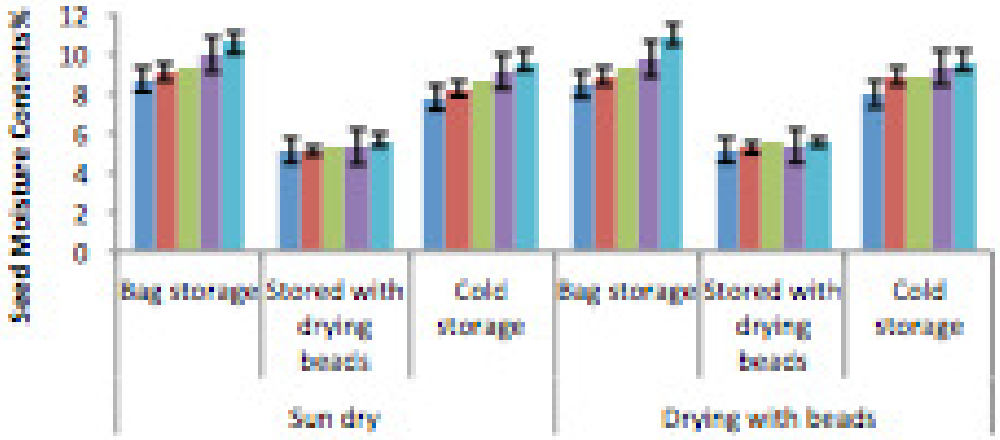


Fig i: Moisture contents %

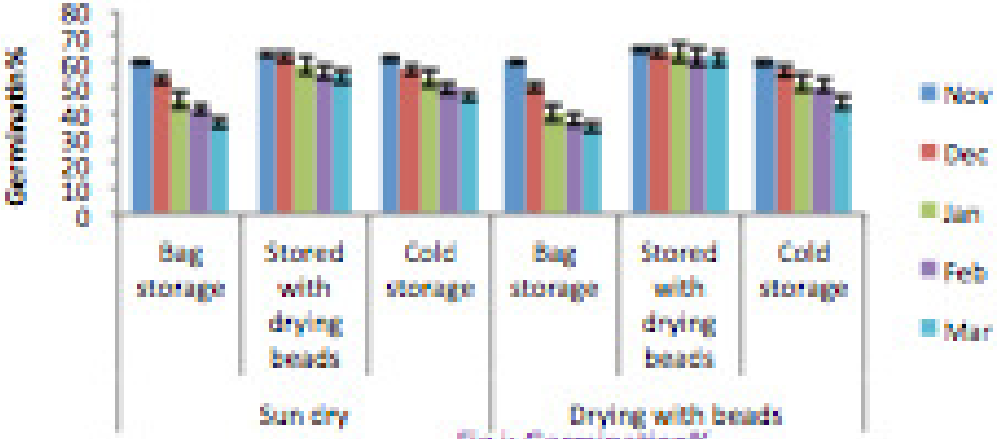


Fig j: Germination%

Comparison of SMC (Fig i) for different storage modules clearly favored storage with drying beads, as it kept the seed dry during 5 month storage irrespective to drying module. While low moisture contents insured seed quality during storage on seeds stored with Drying beads also germinate well (Fig j) after 5 month storage as compared to seeds stored in bag and refrigerator.

Afzal et al. 2016. Annals of Botany *(Submitted)*

Agents of Change….. Sustainability

0.45 M Rs → 3.00 M Rs

PAKISTAN - US ALUMNI NETWORK

INTERNATIONAL AGRICULTURAL DEVELOPMENT

Passions Run High in Pakistan

DENNIS THOMPSON is dedicated to delivering solutions and empowering people and organizations to solve complex problems related to international agricultural development and global food security. His career experience and international credentials include Extension education, agronomy and administration.

THE PEOPLE OF Pakistan exhibit nothing if not passion. Those hailing from agriculturally prominent Punjab, the country's second largest province, are no exception. The University of Agriculture, Faisalabad (UAF) has emerged as a hub of activity for those dedicated and devoted to strengthening the nation's seed industry.

Growing national concern over food security issues and the desire to modernize production agriculture have coalesced and now underpin popular movements to strengthen the seed industry. That being said, the task of how best to move forward is a challenging one. Stakeholder viewpoints often differ as to what might be appropriate for a more highly developed seed industry, and they work diligently to find common ground.

UAF, in the personage of vice chancellor professor Iqrar Ahmad Khan, is involved with fusing an effective public-private partnership atmosphere. Students enjoy new formal and informal seed-related educational opportunities. Industry leaders and governmental officials benefit by having an opportunity to function in a more collaborative environment as they work to iron out differences and shape their industry. Society, as a whole, is the ultimate beneficiator.

Professor Asif Ali Khan, former UAF director of Office of Research, Innovation and Commercialization, is a real "fire in the belly kind of a guy." He previously worked with the vice chancellor related to seed industry development initiatives. Now, as vice chancellor of Muhammad Nawaz Shareef University of Agriculture (MNSU), Multan, he is based in the centrally located Cotton Belt region of Punjab.

Sparking A Movement

Arguably, the formation of the Pakistan Seed Association (PAKSA), both a highly visible and viable public-private partnership can be credited as being a catalyst for other industry development efforts. Energetic and well-spoken former Fulbright Scholar and associate professor, Irfan Afzal stands out among many at UAF responsible for the association's success.

Membership of PAKSA spans the range of private seed companies from the very small locals, to regional, national and multinational seed companies. It brings seed companies together for meaningful dialogue with academic personnel and regulatory bodies. PAKSA initiatives have ranged from organizing educational seminars and workshops to facilitating discussions about modifying seed laws and establishing legislation that recognize plant breeders' rights.

A new undergraduate seed technology major option for students merited industry appreciation and student acclaim. The major provides students a pathway for entrance into the industry. Twenty-six students lay claim to the new credential having recently completed the eight-semester regimen including an internship. Students gained valuable hands-on experience.

UAF collaborated with PAKSA in December to host a successful First Pakistan Seed Congress. The congress brought together representatives from 58 national, local and multinational seed companies and more than 40 research and governmental organizations. More than 125 UAF students, faculty and administrators also participated in the congress.

Presentations were delivered by both Pakistani and international experts, and topics ranged from technical and scientific issues to that of seed industry development and engagement.

While many at UAF work to further the development of the seed industry, their efforts often go unheralded. The reflective and ever-thoughtful professor of plant breeding and genetics, Zulfiqar Ali was recently named director of the Office of Research, Innovation and Commercialization at MNSU, Multan. Now he plans to conduct research on both campuses, while maintaining his rice and wheat functional genomic research programs and expanding the scope to include soybean.

Another is plant breeding and genetics assistant professor, Hammad Nadeem. He is gaining recognition within the industry as an emerging leader working on oilseeds and fodder crops. He now manages UAF's newly compiled soybean research portfolio and seeks resources to underpin the research.

Seed companies are more engaged, and with a broader range of stakeholders, than ever before. They are vigorously working toward development of a more modern seed industry. The stakes are high. Opportunities exist. The players are passionate. Might success be found around the next corner? SW

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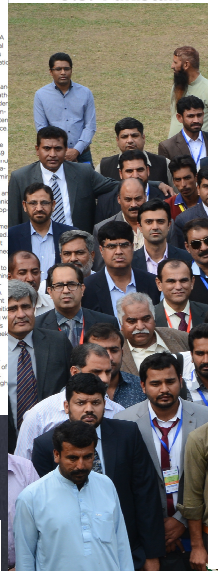
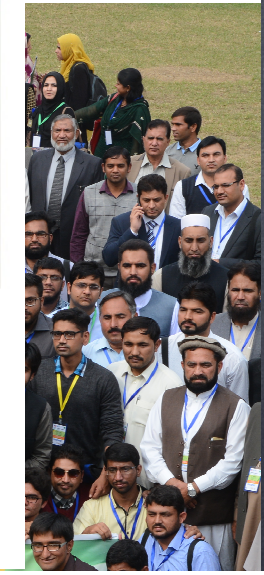


New Competition to Award $100 Million to Help Solve a Critical Social Problem ›



MacArthur Foundation

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DRY CHAIN

Thank You

Make it Keep it DRY

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