

Exchange Patterns and Practices among Users of Genetic Resources

A Study of US Agricultural Stakeholders

U.S. Department of Agriculture
Foreign Agricultural Service

Our Perspective

- Although not a party to the CBD, the US is a trading partner of Parties to the CBD, and a significant provider and user of Agricultural GR.
- We therefore need to consider how an ABS protocol would affect US and other stakeholders in the Agriculture Sector.
- This study collects data on the movement, use and benefit sharing that currently occurs among US GR users and providers.
- Our objective is to understand similarities and differences in movement and use of GR among users and providers of GR for agriculture to inform US domestic and foreign policy.

Preliminary Findings from a Study of Agricultural Genetic Resources among US Stakeholders

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Approach

- Interdisciplinary biology-social science
- Behavioral – what factors matter for the way in which individuals and organizations act?
 - What do we know about the current system?
 - Characteristics of actors
 - Current practices
 - Formal structures and procedures that are in place
 - What are the linkages to key issues under discussion – access, use and benefit sharing.
 - How might national implementation of an International Regime affect access, use and benefit sharing strategies of US stakeholders?
- Examining current context of access, use, and benefit sharing to inform stakeholders and policy makers about potential impacts of the IR

Overall Research Questions

Movement

- Location of GR source, frequency of obtaining new materials;
- Difficulties stakeholders face when obtaining GR;
- Formality of exchange processes;

Product and Process Characteristics

- Use patterns of the materials within the sector;
- Stages of research or phases of production are GRFA used;
- What products of GRFA are used, how GRFA are expressed in final products;

Record Keeping and Reporting

- The use of record keeping;
- Information about materials;

Biological Characteristics

- Importance of diversity of GR used in different areas of agriculture;
- Type of biological material used in research;

User Community Characteristics

- Size and structure of research communities;
- Stakeholder awareness about ABS;
- Relationships among stakeholders.

Research Plan

- Animals and organisms included in this study
 - Aquatics – hybrid striped bass, rainbow trout, shrimp
 - Livestock - cattle
 - *Microbes* – *Listeria*, *Fusarium*, porcine respiratory and reproductive syndrome (PRRS) virus
 - Insects – Honey Bees
- Collect data on the behavior and attitudes of US stakeholders – university, government and private sector.
 - Transaction data
 - Interviews of stakeholders
 - National survey of communities of users
- Analyze data to identify commonalities and distinctions across sectors of agriculture.
- Increase awareness among stakeholders and inform policy makers on the state of access and use practices

Framework

A subset of characteristics of GRFA movement and use.

- **Location and Source** – foreign/domestic and whether the material comes from collections, nature, farms, etc...
- **Formality of Exchange Processes** – the extent to which movement is communicated to a competent authority.
- **Information Structure** – the extent to which the GR information is centralized or decentralized.
- **Visibility** – the extent to which the GR is detectable or reported in the final product or process.
- **User Community** – size and concentration of industry, extent of collaboration, stakeholder composition.

Framework

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Insects

Honey Bees

Microbes

Food safety pathogen

Listeria

Plant health pathogen

Fusarium

Animal health pathogen

PRRS

Aquatics

Hybrid Striped Bass

Rainbow Trout

Shrimp

Livestock

Cattle

Findings 1

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Honey Bees

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Rainbow Trout

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Livestock

Cattle

Information Structure: Listeria, Aquatic animals, & Cattle

Listeria

- Records (incl. source and technical info) made available to users, facilitate validation of samples' identities.
- Moderate centralization, many different US state agencies and researchers with their own collections and knowledge.
- All information may not be readily available or clear.

Rainbow Trout, Shrimp, Cattle and Hybrid Striped Bass

- All highly centralized information sources.
- Due to highly coordinated research groups.
- Due to proprietary nature of the knowledge.

Findings 2

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Plant health pathogen

Fusarium

Animal health pathogen

PRRS

Aquatics

Hybrid Striped Bass

Rainbow Trout

Shrimp

Livestock

Cattle

Formality of Exchange Processes: Listeria & Fusarium

Listeria

- Broad array of government, university, private sector researchers.
- Significant formal exchange.
- Unknown levels of informal exchange.

Fusarium

- GR held by a large number of researchers - around the world.
- Significant formal exchange – log books
- Some informal exchange

Findings 3

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Fusarium

Animal health pathogen

PRRS

Aquatics

Hybrid Striped Bass

Rainbow Trout

Shrimp

Livestock

Cattle

Location & Source: Honey Bees & Rainbow Trout

Honey Bees

- Not-native to US
- Varroa-mite resistant bees obtained from Russia
- US-Russian public sector collaborations developed bees and shared knowledge

Rainbow trout

- Native to US
- Germany obtained lines in 19th century – turn out to be whirling disease resistant
- Improved trout - resilience of stocks in both countries
- Although rainbow trout is native to US, needed material may be outside US.

Findings 4

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Insects

Honey Bees

Microbes

Food safety pathogen

Listeria

Plant health pathogen

Fusarium

Animal health pathogen

PRRS

Aquatics

Hybrid Striped Bass

Rainbow Trout

Shrimp

Livestock

Cattle

Visibility in Product: Fusarium & Cattle

Fusarium

- Need diversity for studies in epidemiology, diagnostics, food safety research, plant breeding, taxonomy, etc.
- Not visible – used to develop assays or resistant plant varieties (not physically present in final product)
- Not transparent – since there is little/no interest in knowing which races were used for product (other than level of virulence & mycotoxin production levels)

Cattle

- Need diversity for productivity improvements
- Very visible – cattle genetics known by breeders and purchaser, can be verified with genetic testing
- Very transparent - use of specific bulls is highlighted in market info since pedigree info informs market value.

Findings 5

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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User Community Continuum: Honey Bees & PRRS

Honey Bees

- Government and university researchers/breeders
- Private sector end users (beekeepers and fruit tree orchard owners) – user of biological resource (improved bee lines)

PRRS

- Government, university and private sector researchers
- End users: Regulatory officials, private sector
- Government research provides diagnostics to regulatory officials – no market value; same product developed by private sector would have market value.

Summary of Findings

Key

Loc & Source:

F = Foreign, D = Domestic

User Comm: S = Small, L = Large,

D = Dispersed, C = Centralized

Location & Source	Exchange Formality	Centralized Information Structure	Visibility in Product	User Community
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Insects

Honey Bees	Foreign/ Domestic	High	High	Yes	Small, Dispersed
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Microbes

<i>Food safety pathogen</i> Listeria	F/D	Med	Low	No	L/D
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<i>Plant health pathogen</i> Fusarium	F/D	Med	Med	No	L/D
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<i>Animal health pathogen</i> PRRS	F/D	High	High	No	S/C
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Aquatics

Hybrid Striped Bass	D	Med	High	Yes	S/C
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Rainbow Trout	F/D	High	High	Yes	S/C
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Shrimp	F	Low	High	yes	S/C
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Livestock

Cattle	D	High	High	Yes	L/D
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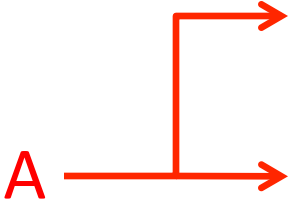
Overall Summary

There is substantial variation in patterns of GR access and use in agriculture.

- **Location and Source**
 - Diversity matters. Geographic distribution of diversity varies
 - Evidence of exchange over long time periods; unexpected needs
- **Formality of Exchange**
 - Complex landscape of regulators and requirements affecting movement and use
 - Evidence of regulatory burden
- **Centralized information Structure**
 - Information can be in centralized sources or highly dispersed
 - Information can be highly concentrated in private sector or generally publicly available
- **Visibility**
 - Detectability in the final product varies
 - Incentives to disclose vary
- **User Community**
 - Substantial integration in research and development across stakeholders
 - Continua of users

Overall Summary

There is substantial variation across areas of agriculture.

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- The diagram consists of two main parts: a red 'A' and a blue 'U'. The red 'A' has a horizontal arrow pointing right to the 'Formality of Exchange' bullet point, and a vertical line that turns right into an arrow pointing to the 'Location and Source' bullet point. The blue 'U' has a horizontal arrow pointing right to the 'Centralized information Structure' bullet point, and a vertical line that turns right into an arrow pointing to the 'User Community' bullet point.
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- U
- B\$

Issues to consider

- Although there's general lack of awareness of CBD ABS negotiations among stakeholders, its underlying principles, such as benefit sharing, are actively being practiced.
- Greater understanding of:
 - Visibility of GR in end products and processes.
 - Centralization: under what conditions does it lead to optimal access, use and benefit sharing outcomes.
 - Existing norms, cultures and characteristics of user groups
 - Existing benefit sharing practices
 - Education and training – identification of species, etc.
 - Scientific investigation into the health of populations
- Potential regulatory linkages: How is the regulatory system structured for different agricultural areas?
- Opportunities for incentives
 - Market benefits to transparency
 - Club goods (eg. microbial commons)
 - Rationalization of regulatory processes to minimize burden