

Determinantscofevariety_choice_among

potato-growers-instite Bolivian-highlands

Presentation at the

2008 SANKEMECKSP Annual Meeting

sos Baños, Palippines

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- =Potato=producers=in=the=Bolivian=highlands=adopt=many=varieties= =of=potatoes
- Variety-selection-depends-on-attributes-of-the-potato,-includingyield, tastes, disease-and-pest-resistance, and-resistance-to-frostand-drought
- Variety-choice-also-depends-on-producer-attributes, such as concernation, household-labor-availability, and access to information; access-to-and-performance-of markets may be critically-important
 - When markets are not available, farmers would be more likely to select varieties for taste and storage characteristics; remote farmers may plant highly diversified variety profiles due to individual tastes and preference and exposure to different risks (market and others)
 - Variety development should include considerations of farmer demand for attributes

Objectives

- - made by farmers in Bolivian highlands
 - Describeniskerelated and other characteristics of alternative varieties
 - Analyze farmer household characteristics, risk concerns and
 - demand for potato-attributes
 - Analyze the determinants of "demand" for potato attributes
 - Provide information for potatorescarchers relative to farmer preferences for <u>different variety attributes</u>



Review of literature of variety studies:

- mumbereofestudiesby=Renkow=(Honduras-maize)
- Shively and friends (adoption of soil conservation-Philippines)
- <u>Edmeades & Smale (plantain in U</u>ganda)

Major points:

- Risk attributes may be a strong determent to adoption of variety and techniques
- Distance to market has been found to affect the risk return tradeoffs



- Interviews=with=scientists=and=extension=personnel=(November= 2008);
 - Identify-varieties-and-their-attributes-
 - Describe-current=research=program:=main=constraints=being=addressed-through _____potato=research
- <u>-Survey-of=farmers=(November-2008);</u>
 - Survey instrument, initial design at V15 review and revisions in consultation with Fundacion 22801N12A
 - Based-on-previous-SANREM-work-(baseline_surveys) in Bolivia and Ecuador; but-modified-to-account-specifically-for-variety characteristics and exposure-torisk
 - Implementation: three-villages in Cochabamba-Department; 145-total interviews
 - Research (data collection) was designed to increase variation in climatic and market conditions

Etousenole Survey Forentions

— Toralapa (20):

- <u> Elighaltitude, dry frost prone</u>
- Good-road-access (major-paved-road-nearby-goes-right-to-Cochabamba-city). Deoblom with Torology in that a giogle wation, or odomiontor due to construct
- Problem-with-floralapatis-that-a-single-variety-predominates-duc-to-market= integration-and-preferences-for-uniform-varietal-characteristics

Colomi(68):

- More-moisture-trypically-than-forminpa-
- <u>=Less=frost=(more-blight)</u>
- Good-paved-road-access,-many-colololed-roads-in smaller villages;-major road-to-
- =Cochaibannba=is=nearrby

Morochata (57):

- More moisture that Torolapa; warmer by reputation mo-weather-station
- Home to PROINPA-supported breeding-program.
- Relatively poor road conditions-necessary-to-travel-on-steeply-sloped-areas-to-get around; washouts frequent on many-roads; to-reach-Cochabamba-its-necessary-tocross-Andean ridge; fairly remote

Colomi

Road to Morochata

Potato Market in Colomi

Methods: Theory and Feomometrie Model

- Basic modeling focus: households make decision about how much to plant of each of variety encountered (choice set).
 Implicit assumption is that household could plausibly plant each variety (technology set is available to all)
- <u>Expected utility-maximization-subject-to-variety</u> availability <u>constraints (risk-averse, safety=first=framework)</u> and stochastic <u>production-and prices</u>
- Decision is modeled as a function of variety characteristics and household characteristics
 - We observe many zero values for the dependent variable
 - Many farmers plant zero acreage of many varieties
 - No farmer plants every variety

Econometre Model

- ╺╼╾╾╾゠Ĕ(₽,=₽,>X,₽,>=0) ==XB=EE(₽,=₽,>X,B,)
- where:-
- V=area-planted_to-a-single-variety (0<=V<=4)</p>
- Y=Unobservedlatent-variable-representing-demand for variety
- X=-variety-and=household=characteristics
 - <u>B=vectoreofeanmeters</u>
- ----Each=household=characteristic=will=have-cleven coefficients=(one=for=cach=
 - Variety
 - Desired results of the project:
 - How do variety characteristics impact potato-planting decisions?
 - Coefficients of variety characteristics=will=quantify=farmers=revealed=preferences= for different characteristics

Results: Porato Varieties

- During-interviews-with PROINPA-researchers-and field visits, we identified a total of 11 varieties (8-or-more-observations-of variety-adoption)
- Blighttolerance is the most common fimproved characteristic; others include shorter growing season, differential water tolerance
- Veryalittleainsectaresistance (possiblyarelated to ease of obtaining appendic definition of the state of the
 - Varieties-studied-cover-about-90% of potato planting area in the
 - Toralapa 98%)
 - All 11 varieties are present in Colomi; 5 in Horalapa; 8 in Morochata

Results: Portio Artefies

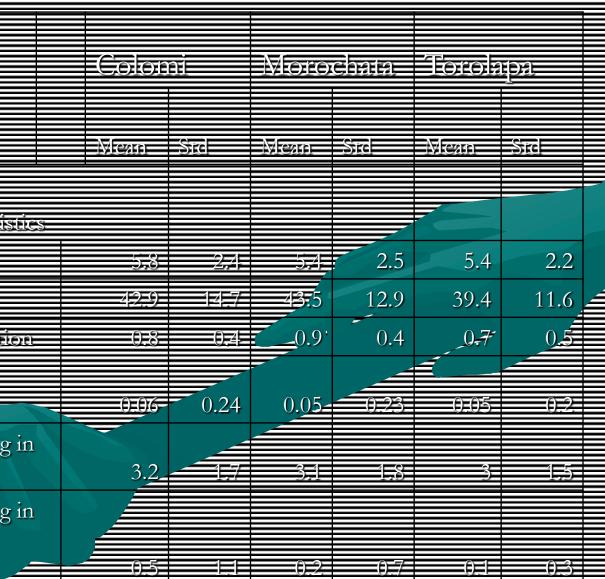
- Waych'a by far the most common (124-obs.)
 - Average-area-planted=0,4=Ea,

 - Often-used-as-a-benchmark-for-comparison-(most-familiar) of new varieties
 - Hill also-called Runa foralapa) (52-obs-on-average 0.24 Ha.)
 - <u>Blight=esistant=(most=common=blight=esistant_cul</u>tivar in survey)
 - Price-was-generally-lower-than-Waych-a in 06-07
 - -Pinta=Boca: occurs often (50-obs.), but in small-plantings (on-average=09=Ha=)
 - Lower yielding, less resistance to pests, disease, climate
 - Traditional to serve to guests, friends family and on Easter Holiday
 - Larger portion of crop planned for home-consumption (average 40%-of erop is home-consumed) than other common-varieties

Results: Vartety Attributes

- Most=plantings=and=varieties=are=planned=for=multiple=end=uses= (consumption=and=sale)
- - Example=1=one-question=asked=about=fertilizer=use=and MANY farmers were-only-able=to-provide=information=on=total=quantity of fertilizer purchased=and=stated=that=it=was=spread=evenly=throughout the farm Example=2:=most=farmers=stated=that=they=sprayed all the varieties evenly= for=pests/disease;=even=resistant=varieties=were reportedly sprayed for_late blight=(for=those=farmers=who=sprayed=for late blight)
 - Risk-characteristics are categorical: highly susceptible, moderately susceptible, moderately tolerant, highly folerant, (moderately susceptible is base category)
 - Information on risk tolerance-comes_from=PROINIPA_personnel_and= publications (particularly Julio-Gabriel)





ElouseholdECharacteristics

Elousehold Size

=Head's=Age

EleadEPrinnaryElelucation

Elead Secondary

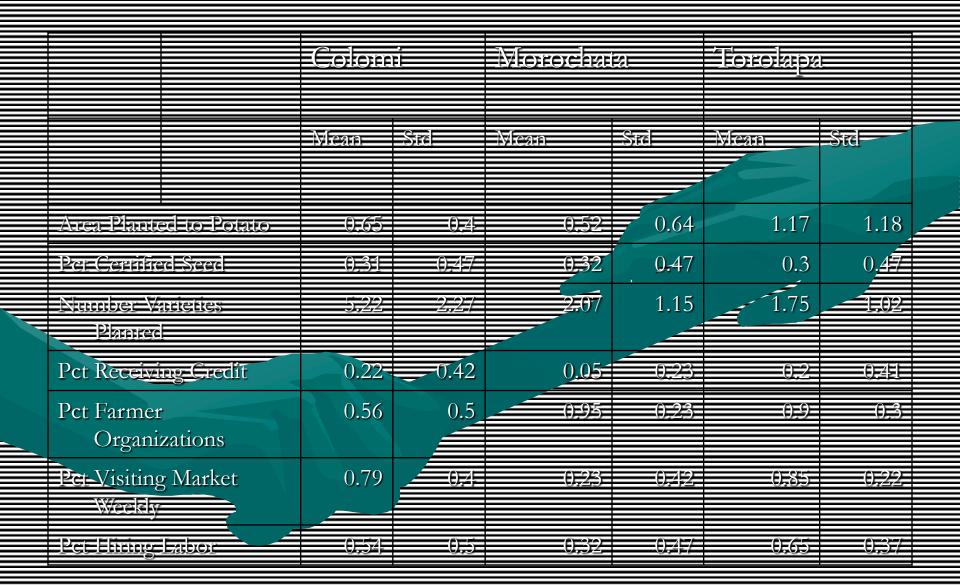
Education

Members Participating in Potato Activities

Members Participating in <u>Non-farm In</u>come

<u>-Generation</u>

Results: Summary Statistics



Results: Summer Statistics

- Elousehold-size-and-age-very-similar-across-regions-
 - --Landholdings_differ,_but=total=numbers_of=household=members-participating= in-potato-production-is-similar
- <u>MosteparticipationeineoffefarmeactivitieseisefoundeineColomi</u>-(accessetoetransportationeandenearbyelaboremarkets)
- Large-difference-in-number-of-varieties-planted
- Differential_access_to_credit, possibly_related to access to markets, Eg:-very_little_credit_availability_in=Morochata
- Strength of farmer organizations varies: most isolated farmers
- -arc-more-likely-to-participate-in-organizations
- Farmers outside of Toralapa visit the market less frequently
- More agricultural market an<u>d labor-market-participation-in</u> Toralapa

Prefiminary Results: Model Estimation

- Not-yet-ready-for-prime-time
- Yield=attributes-do=not=appear=to=be=as=important=determinants=of=variety selection=as=are=disease=resistance=and=taste:=risk=management=is=an=important= consideration=when=choosing=potato=varieties
 - •—Yieldis=moreimportant=in=Foralapa=and=least=important=in=Colomi
 - Quantitative=tradeoffs=between=different=attributes=are=measured: substitutability is increased=in=towns=that=are=closest=to=markets;=distance=also affect substitutability within towns=(more=remote==>less=substitutability)=====
 - Substitutability-between-attributes-varies-by-location: less substitution in remote areas No-statistically-significant=relationship-between-fandholding size and degree of-diversity-in-variety-adoption.
 - Household labor-availability is significant; tradeoffs between labor and timing of harvest
- Farmer education (weakly) associated with adoption of fewer-varieties
 - Access to markets associated with fewer-varieties being adopted the most remose households are the most diversified

Summer and Conclusions

- We have quantitative information about tradeoffs Bolivian highland potato farmers make between attributes like yield, taste and risk
- Solution Sector Sector
- Information=can=be=used=to=guide_variety development; there is a clear need to=have a number of_varieties with
 - different attributes
 - Information from this study<u>can be incorporated into</u> an outreach program