

## Extended Abstract

<b>Paper/Poster Title</b>	<b>Farmers' Stated Preferences and Willingness to Pay for Climate Resilient Potato Varieties in Kenya: A Discrete Choice Experiment.</b>
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<b>Abstract</b>	<i>200 words max</i>
<p>Despite sustained efforts by various research organizations in developing and disseminating climate resilient varieties, adoption of climate resilient potato varieties (CRPVs) remains low in Sub-Saharan Africa. This has been majorly attributed to limited coordination between formal research institutions and farmers hence sidelining farmers' preferences especially smallholder farmers. Considering farmer preferences in the breeding process may yield optimal combination of varietal attributes hence increasing adoption. Therefore, this study used a discrete choice experiment to investigate farmers' preferences and mean Willingness to Pay (WTP) for various attributes of CRPV. Results indicate that farmers have a strong preference for high resistance to pests and diseases as compared to other attributes which include low water requirements, short maturation period and high yield. Despite farmers preferring low prices for CRPV attributes, we also note that they were low price responsive. A small change in price did not affect their preferences for other CRPV attributes. This study emphasizes on the need for participatory breeding efforts that embed traits preferred by farmers hence satisfying the demands of different population segments based on age, gender and education level.</p>	
<b>Keywords</b>	Climate-resilient-potato-varieties; Preferences, Willingness-to-pay; Discrete-choice experiment.
<b>JEL Code</b>	Agricultural and Natural Resource Economics; Environmental and Ecological Economics: Agriculture see: <a href="http://www.aeaweb.org/jel/guide/jel.php?class=Q">www.aeaweb.org/jel/guide/jel.php?class=Q</a>
<b>Introduction</b>	<i>100 – 250 words</i>
<p>Potato production in Sub-Saharan Africa (SSA) is highly threatened by climate change and variability. A high reduction of potato yields by 56% was reported during the 2016-2017 drought in Kenya (International Potato Center, 2017). Previous studies however show that, potato production levels can double up without expanding the area under production by developing, disseminating and adoption of climate resilient varieties (Paker et al., 2019). Despite various efforts by the Government of Kenya to promote breeding programs for Climate Resilient Potato Varieties (CRPVs) and their dissemination, there is limited coordination between formal research institutions and farmers. This has resulted into sidelining farmers' preferences especially smallholder farmers leading to lower adoption rates (Sánchez et al., 2017). A study by Kimathi et al. (2021) shows that adoption of the disseminated CRPVs is still significantly low among potato farmers in Kenya despite the numerous efforts associated with these varieties. Considering farmer preferences in the breeding process may yield optimal combination of varietal attributes hence</p>	



increasing adoption rates (Sibiya et al., 2013). Therefore, understanding trait preferences of different farmers is key to embracing the full procedure for seed system development.

In this research, we use a discrete choice experiment to investigate farmers' preferences and mean Willingness to Pay for various attributes of CRPVs to help design efficient participatory breeding programs that may result into development of farmer-preferred potato varieties and hence boosting adoption rates. The study further explores preference heterogeneity of climate resilient potato attributes based on age, education level and gender of the farmer.

### **Methodology**

*100 – 250 words*

The study was carried out in Meru County which is the second highest potato producing Counties in Kenya. The county is characterized by four main agro-ecological zones; the upper and lower highlands where potatoes are mainly grown, and the upper and lower midlands (Jaetzold et al., 2007).

A Discrete Choice Experiment (DCE) was conducted on a sample of 384 farmers drawn from smallholder potato farmers in the different agro-ecological zones of the County using multistage sampling technique. The experiment involved three stages. In the first stage, potential attributes and attribute levels were identified based on the characteristics of CRPVs, literature and validated by a focus group discussion. The second stage involved designing of choice cards. Each choice card had two unlabelled scenarios of CRPVs and one opt-out option for farmers who unwilling to uptake any CRPV. D-efficient design was used with an efficiency of 96.85% which was a relatively good measure of D-Optimality. A design is said to be D-Optimal if it yields data that enables estimation of parameters with low standard errors and the design can extract the maximum amount of required information from the respondents. The design generated 12 choice situations which were blocked into 4 profiles. The final stage involved econometric analysis of DCE which was based on the Random utility theory (Louviere et al., 2010).

To identify sources of heterogeneity, interactions between preferences and farmer characteristics were computed.

Values of Willingness to Pay (WTP) for different varietal attribute levels were derived as: -

$$\text{Marginal WTP} = - \beta_{\text{attribute}} / \beta_{\text{price}}$$

### **Results**

*100 – 250 words*

Potato farmers preferred CRPVs that were highly resistant to pests and diseases. The estimated coefficient for resistant was positive and significant. The magnitude of the coefficient was high (7.755) and almost thrice the magnitude of all other attributes. The estimated coefficient for low water requirement was positive and significant. The magnitude of the coefficient (2.341) indicating that it was the second most preferred attribute after resistance to pests and diseases. The coefficient of high yield (2.061) was positive and significant revealing that potato farmers preferred varieties that were high yielding (30T/Ha). The attribute of short maturation period (<3 months) had a positive and significant coefficient and a magnitude of 2.017. This indicates that potato farmers preferred varieties that matured faster. The price attribute was negative and significant. This indicates that farmers preferred lower prices for CRPVs holding all other factors constant. However, the absolute magnitude of the price coefficient was relatively small revealing that potato farmers in Meru county were low-price responsive. A small change in price did not affect their preferences for other CRPV attributes.

Gender, age and education level of the farmer were significant sources of preference heterogeneity for preferred CPRV attributes. Potato farmers were willing to pay an average of Ksh 327.740 per Kg for varieties resistant to pests and diseases, Ksh 98.954 per Kg for varieties that have low water requirements, Ksh 87.083 per Kg for high yielding varieties (30T/Ha) and above, and Ksh 85.256 per kg for varieties with short maturation period (<3 months).

### Discussion and Conclusion

100 – 250 words

Results reveal that farmers have a strong preference for CRPVs with high resistance to pests and diseases as the most important potato crop trait as indicated by the high value of willingness to pay and a high coefficient value. Other CRPV preferred attributes include low water requirements, short maturation period and high yield. This shows that farmers not only consider productivity of potato varieties when making decision on whether to adopt or not, but they also consider the adaptability of potato varieties to the changing factors of climate that have adverse effects on potato crop. Farmers also prefer lower prices for CRPVs but were low-price responsive. A small change in price did not affect their preferences for other CRPV attributes. Preference heterogeneity varies by socioeconomic characteristics. Male farmers prefer high yielding varieties, older farmers (>35 years) shifted their preference from low water requirement attribute and the more educated a farmer was, the less the preference for resistance to pests and diseases attribute.

In conclusion, breeding efforts should embed traits for CRPVs preferred by farmers. Results indicate that CRPVs have a high potential for diffusion should ongoing breeding programs focus on development of potato varieties that are highly resistant to pests and diseases, have high yielding potential with low water requirements and short maturation period (<3months).

