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## **Unrealized potential: the role of agro-dealers in scaling new maize seeds in Kenya**

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## **Unrealized potential: the role of agro-dealers in scaling new maize seeds in Kenya**

### **Abstract**

The Kenyan maize seed sector is one of the strongest in Africa with relatively high hybrid adoption rates among farmers, a growing number of seed companies, and large agro-dealer network for seed dissemination. Nonetheless, maize yields have been stagnating over the last decades and the long-existing hybrids make up the majority of seed sales. Future maize sector development depends, in part, on achieving faster varietal turnover. This paper investigates the incentives, strategies, and capacities of agro-dealers to facilitate the uptake of new improved maize seeds. Data was collected during the 2019 seed-purchasing season from agro-dealer owners (n=80) and farmers when purchasing seed (n=466). Results show that farmers were willing to experiment with 'new' varieties, but that tended to replace their varieties with other relatively old varieties that are most prevalent at agro-dealers. Agro-dealers based varietal selection mainly on what farmers requested. Agro-dealers have limited engagement with seed-producing companies, local governments, or others for promoting few seeds. Change and evolution in the seed system is urgently needed, but the current system provides limited scope for innovation. When farmers have changed varieties, the agro-dealer has proven to be a key influencer and its power has been underutilized in current seed promotion practices.

### **Keywords**

Seed system, agro-dealers, hybrid, productivity

## 1 Background

Crop genetic improvement has been crucial in feeding the world population (Lipton & Longhurst, 1989) and has resulted in 20 to 50% yield growth in developing countries between 1960 and 2000 (Evenson & Gollin, 2003). The high social return of crop genetic improvement has led to substantial investments in agricultural research and development (Alliance for a Green Revolution in Africa, 2017; Toenniessen, Adesina, & DeVries, 2008). However, varietal improvement does not automatically lead to widespread adoption of these varieties. In Kenya, the introduction of hybrids in maize farming has been very successful but turnover to newer varieties in the last decade has been very poor (Abate et al., 2017; Smale & Olwande, 2014; Spielman & Smale, 2017). The average variety age of the most popular hybrid varieties measured by Abate et al. (2017) was over 13 years old. A key example of this is the case of H614. This variety was released by the Kenya Seed Company in 1986 and over the last 30 years, this variety remained to be one of the most popular varieties in the country (De Groote, Doss, Lyimo, & Mwangi, 2002; Hassan, 1998; Spielman & Smale, 2017).

It is recognized that agro-dealers also play a pivotal role in maize seed systems, including in the adoption of new maize varieties (USAID, 2010). Because of the very dispersed markets and poor infrastructure in rural areas, the direct sales of seed companies in their own shops is very limited and a most of their seed is sold through agro-dealer networks (Erenstein & Kassie, 2018; Langyintuo et al., 2010). Therefore, they are a key direct, external source of material and information to farmers, excluding their own surroundings (Hoogendoorn et al., 2018). The important role of agro-dealers as extension agents has been highlighted in several studies and reports. In the absence or presence of a weak extension system, agro-dealers are the major alternatives in many of these communities for technology transfer and in the supply of improved agro-inputs (Nagarajan 2015).

Also in Kenya, the main way seed produced by seed companies reaches the farmer is through local agro-dealerships. Distributors or hub agro-dealers buy seed directly from the seed companies and sell smaller quantities to local agro-dealers, often called agrovets (Christinck, Rattunde, Kergna, Mulinge, & Weltzien, 2018). With over 10,000 stores in the country (Okello, Paruzzolo, Mehra, Shetty, & Weiss, 2012), Kenya is together with Malawi one of the countries in Africa with the most extensive agro-dealer networks (Burke, 2016). Cultivating New Frontiers in Agriculture (CNFA) and the Alliance for a Green Revolution in Africa (AGRA) have been instrumental in development of this sector (Makinde & Muhhuku, 2017; Odame & Muange, 2011; The World Bank, 2013). Through the Kenya Agro-dealer Strengthening Program (KASP) and other programs, they (i) trained over 3000 agro-dealers in business management and productive farming methods, (ii) facilitated access to credit for agro-dealers, (iii) supported demand creation activities such as field days and (iv) supported local agro-dealer associations.

Allgood (2011) stressed that the two main roles of agro-dealers are to provide farmers with (i) affordable and convenience access to technologies to enhance yields as well as (ii) proper advice on how to use these technologies for maximal economic return. All this is summarized by Odame and Muange (2011, p.1): “*Whilst the array of actors involved in input provision has grown enormously, the vision of how inputs should be delivered has narrowed to a single, dominant model: the private, independent, agro-dealer*”. While the role of agro-dealers in the agricultural value chain has been discussed as well as the constraints they face (Adesina et al., 2014; Bayesian Consulting Group Limited, 2016; Makinde & Muhhuku, 2017; Odame & Muange, 2011; Odoendo, De Groote, Wanyama, Bett, & Ouma, 2007), minimal attention have been given to their role in varietal turnover discussion. So far, seed systems research has mainly focused on the factors influencing farmers’ adoption of or seed companies’ investment in new

varieties. The agro-dealer is one of the key decision makers regarding the seed choice farmers have. Therefore, we need a much better understanding of their choices and strategies regarding maize seed sales as well as the influence they have on farmers. From a farmer point of view, the seed selection process at the agro-dealer has also not been investigated to our knowledge. The moment farmers go to agro-dealers, they become shoppers with their own motives, needs and desires. Gaining insights in farmer and agro-dealer decision making about maize seed can help understanding slow varietal turnover in Kenya maize seed systems. The main goals of this study are to (i) understand the choices being made by farmers and agro-dealers regarding varietal selection, (ii) learn what factors influence varietal decision making and (iii) develop recommendations to improve uptake of new improved maize varieties at agro-dealer level.

## **2 Material and methods**

### *2.1 Data collection*

Data was collected at the start of the main maize growing season (March, 2019) in Kenya through two methods: agro-dealer surveys and farmer intercept interviews at the agro-dealer. Important to note is that data collection was influenced by the severe drought at the start of the March-May season in Kenya, due to the tropical cyclone ‘Idai’ that redirected precipitations away from the subregion (FAO, 2019).

#### *2.1.1 Agro-dealer survey*

A survey was carried out in 80 agro-dealer stores across the country in 5 of the 6 defined major maize agro-ecological zones in Kenya (Hassan, Njoroge, Njore, Otsyula, & Laboso, 1998). 2 counties were randomly selected in each of the following agro-ecological zones: highlands, wet upper mid-altitude, wet lower mid-altitude, dry mid-altitude and dry transitional. In those 10 counties, one sub-county was randomly selected and in that subcounty 4 agro-dealers in urban centers and 4 agro-dealers in rural centers were randomly selected from local agro-dealer lists. The different counties and locations of the agro-dealers are shown in Figure 1.

The agro-dealer survey was focused on maize seed sales and covered five topics: (i) current maize seed varieties in store, (ii) selection of new maize seed varieties, (iii) promotion of new maize seed varieties, (iv) information access and transfer to farmers and (iv) opportunities and challenges of the agro-dealer to increase maize seed sales. The duration of the interview was between 60 and 90 minutes.

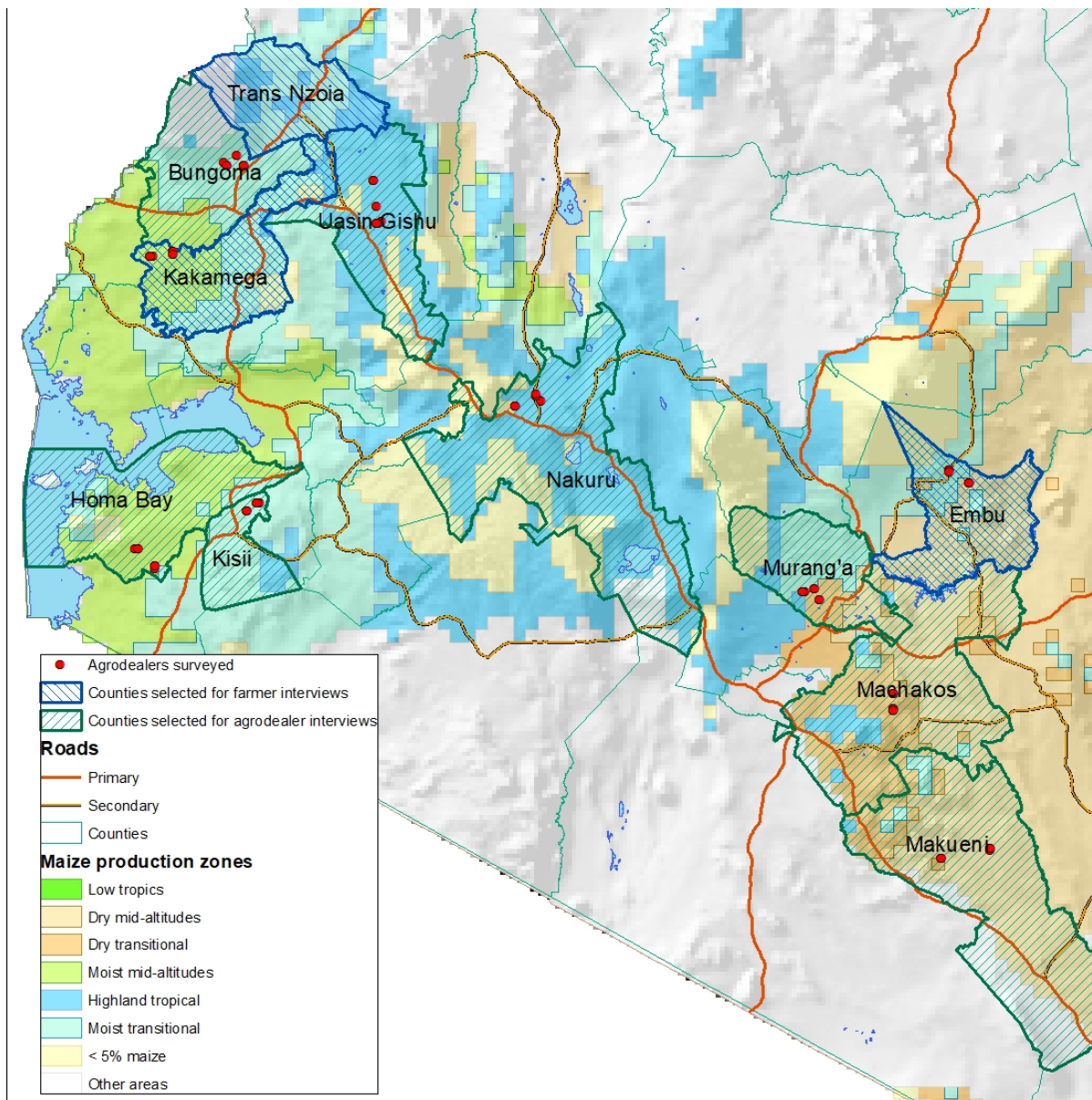


Figure 1: Locations of agro-dealer surveys and farmer intercept interviews

### 2.1.2 Farmer intercept interviews

Intercept interviews were carried out with farmers coming out of an agro-dealer shop that purchased maize seed for themselves or someone in their family. Respondents were invited when coming out of the agro-dealer and participated in a 10-15 minute survey in a tent, set up next to the agro-dealer. Three counties were selected based on their agro-ecological zone and the high prevalence of maize farming: Embu (dry mid-altitude), Kakamega (moist mid-altitude) and Trans-Nzoia (highlands), also indicated on Figure 1. In each county, a rural and urban city or town was selected and depending on foot traffic per agro-dealer, 1 to 3 agro-dealers were selected in each location.

The farmer intercept interview was focused on 4 topics: (i) the purchased maize seed variety, (ii) the process of purchasing maize seed, (iii) information sources regarding maize seed and (iv) selection of the agro-dealer. The characteristics of the sample are described in Table 1. Due to the absence of rain and relatively low foot traffic in the stores, each farmer coming out of the agro-dealer was invited to participate in the survey. 1/3 of our sample consisted of female

farmers and average age was rather high, but consistent over our three locations. Farmers in Trans-Nzoia did have larger maize fields and a larger portion of the maize was used for sales.

Table 1: Characteristics of the farmers participating in the intercept interviews

	Total	Embu	Kakamega	Trans-Nzoia
N	466	172	205	89
Female (%)	33.7	37.8	33.2	27.0
Age in years (SD)	48.3 (15.6)	50.0 (15.6)	46.9 (15.4)	48.3 (17.9)
Farming experience in years (SD)	18.0 (14.6)	18.2 (14.1)	17.8 (14.6)	17.8 (15.7)
Size of maize field in acres (SD)	2.0 (2.7)	1.5 (2.2)	1.4 (1.4)	4.2 (4.3)
Part of maize harvest sold (%)	38.7	43.3	26.9	57.4
Urban agro-dealer (%)	53.4	57.6	54.1	43.8

### 3 Results and discussion

#### 3.1 Varietal selection by farmers and agro-dealers

While it is often stated that farmers are not willing to switch to newer varieties and stick to what they know, our results show that almost 60% of farmers have changed the variety they grow in the last 3 years and almost 80% have replaced their variety in the last 5 years (Figure 2). Only a small group of farmers stick to the variety they have been growing for over 5 years and very select group have been growing the same variety 10 years or longer.

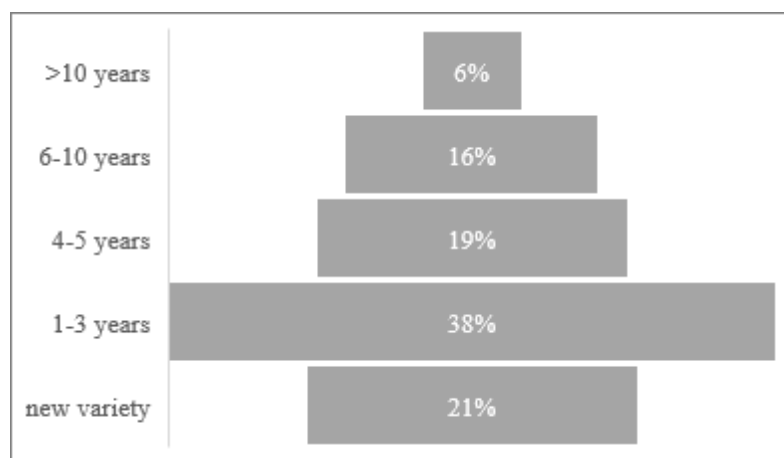


Figure 2: Number of years the purchased variety has been bought

When comparing the market share of the repurchased varieties versus the newly purchased varieties (Table 2), results show a decrease in the average age of the varieties. However, most popular varieties among farmers have been released more than 10 years ago or longer. Only SY954 (released in 2017) can be categorized as new variety. Some of the varieties of the 80's and 90's are decreasing in market share. H614D and PHB 3253 are no longer among the most popular varieties in our sample. However, important to highlight is that farmers are dependent on the offer of the agro-dealers. When market share is decreasing among farmers, this might be influenced by the available offer instead of changing preferences. Therefore it is necessary to compare this with the available offer.



Table 2: Top 10 varieties selected by farmers at the agro-dealer

Repurchased variety (n=393)			Newly selected variety (n=106)		
Variety	Year released	Market share	Variety	Year released	Market share
H6213	2002	28%	H6213	2002	33%
SC Duma 43	2004	16%	KSH624	2004	12%
H614D	1986	8%	H513	1995	9%
H513	1995	8%	SY594	2017	7%
KSH624	2004	7%	KH500-22A	2008	6%
WH 505	2003	5%	SC Duma 43	2004	5%
PHB 3253	1996	4%	WH 505	2003	4%
H629	2000	3%	DH04	2001	3%
DK 8031	2003	3%	WH 605	2008	3%
H516	2001	2%	H629	2000	3%
Average unweighted variety age	1999			2004	

The varieties selected by the farmers in our sample strongly overlap with the available offer in our agro-dealer sample (Table 3). Popular varieties such as SC Duma 43, DK8031 and H513 are available in 50% to 70% of the agro-dealer sample, independent of agro-ecological zone. The average unweighted age of the top 10 most available varieties is old, 20 years on average. This is completely in line with the varietal selection farmers make. When older varieties are present in stores, farmers are limited in their choice to these older varieties. But the situation is improving. When looking at the varieties that are introduced in the last 5 years and the last 3 years, the average varietal age is going down with varieties such as SY954, Sungura 301 and DK777, all varieties that are released in the last 5 years.

Table 3: Top 10 varieties available in agro-dealers

All varieties available			Varieties introduced last 5 years			Varieties introduced in the last 3 years		
Variety	Year released	% of Agro-dealers	Variety	Year released	% of Agro-dealers	Variety	Year released	% of Agro-dealers
SC Duma 43	2003	70%	SC Duma 43	2004	33%	SY594	2017	20%
DK 8031	2003	61%	DK 8031	2003	31%	DK 8031	2003	20%
H513	1995	53%	DKC 80-33	2004	21%	SC Duma 43	2004	15%
H614D	1986	44%	SY594	2017	20%	DKC 80-33	2004	14%
H6213	2002	40%	PHB 3253	1996	19%	H522	2003	13%
PHB 3253	1996	40%	PHB 30G19	2006	16%	Sungura 301	2015	11%
H629	2000	35%	H6218	2009	16%	H6218	2009	11%
PHB 30G19	2006	34%	H522	2003	16%	WE1101	2013	9%
KSH624	2004	31%	H6213	2002	15%	DK777	2016	8%
DKC 80-33	2004	28%	H513	1995	14%	PHB 3253	1996	8%
Average unweighted variety age	1999			2004			2008	

### 3.2 Influential sources on farmer and agro-dealer decision making

To better understand the varietal choices farmers and agro-dealers make, one needs to understand their influencing factors. Regarding maize seed, the biggest reliable information sources of farmers are other farmers (75%), radio (61%) and agro-dealers (57%) (Figure 3). This shows that farmers are strongly influenced by their surroundings. The most important external information source is radio. The influence of demo-plots, NGO's, seed companies or research institutes is much lower. These results are in line with the findings of Hoogendoorn et al. (2018). Agro-dealers come out as an important source but this might be influenced by our sample. Nonetheless, when agro-dealers are such an important information source, it is important to know how they make decisions on which varieties to stock and sell.

When looking at agro-dealer influences on the other hand (Figure 4), results show that they are basing their decision on farmer preferences. This means that outside influence in the system is very minimal: farmers are influenced by other farmers and agro-dealers, while agro-dealers are influenced by their consumers, i.e. the farmers. In a system where no change is wanted, this model works perfectly and supply is well adapted to the demand. However, in a system where change and evolution is wanted (such as maize seed systems), this model puts a serious block on potential development of the sector.

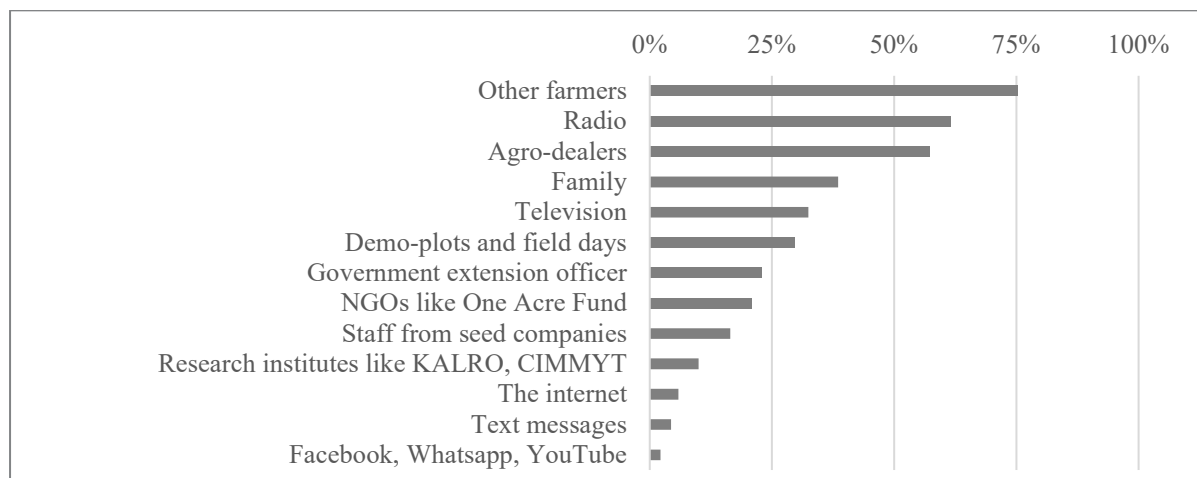


Figure 3: Reliable seed information sources for farmers (n=466)

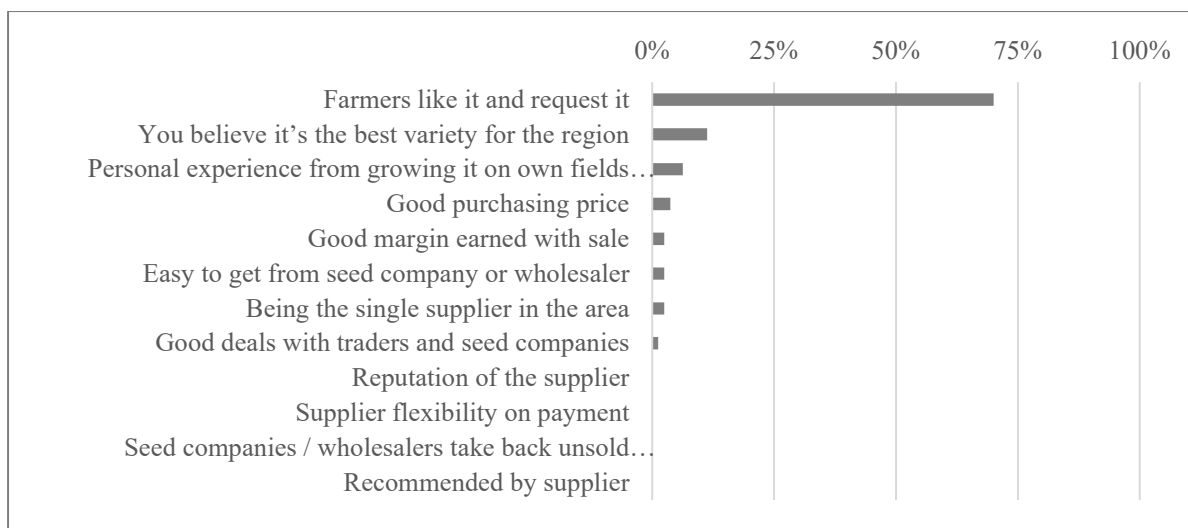


Figure 4: Most important factor for agro-dealer varietal selection (n=80)

### 3.3 Triggers for varietal improvement

When farmers do change the variety they buy, it is worth looking at what triggers this behaviour change. Figure 5 ranks the factors that influence farmers to buy a new variety. Also here, the most important influence is other farmers, by seeing their plots (29%) or by receiving advice from them (14%). The second main influencing source is the agro-dealer (28%) which confirms their importance in varietal decision making. Radio/TV (3%), extension officers (3%) or demoplots (2%) have far less influence on varietal decision making. Therefore in-store varietal promotion should not be neglected when promoting new varieties and influencing agro-dealers can be far more effective than direct communication efforts to farmers.

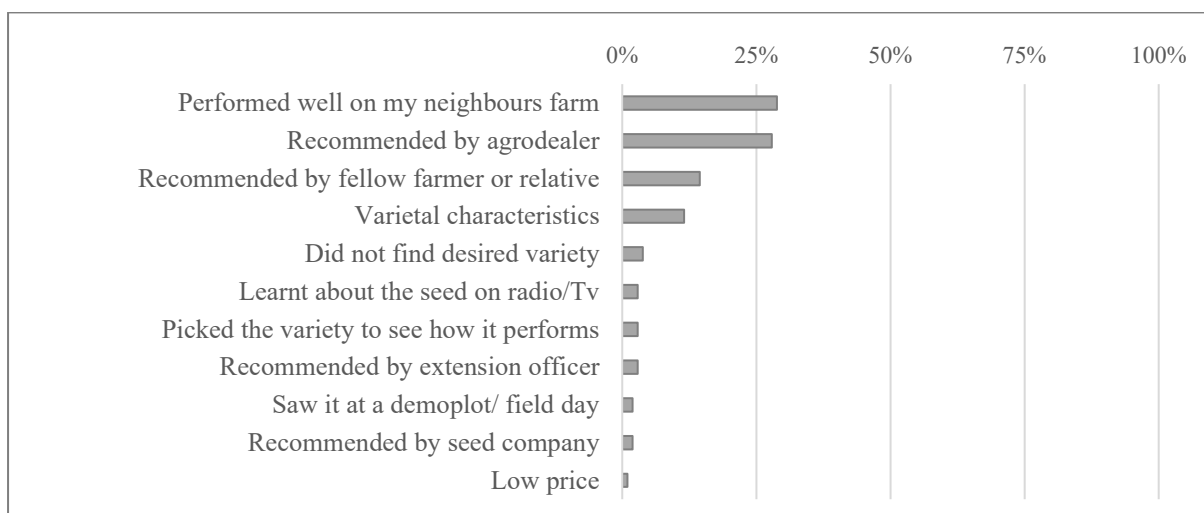


Figure 5: Triggers for buying a new variety among farmers (n=106)

Figure 6 gives an overview of the practices agro-dealers have been using to promote new varieties they have in store. Most common practices are putting packs on display and verbally recommending a variety to farmers. Least popular are giving discounts or showing varieties in a demoplot. Overall, promotion of new varieties is fairly limited and most actions are not done regularly. This is in line with the results of Bayesian Consulting Group Limited (2016) where it is mentioned that less than 1% of the agro-dealers budget goes to marketing.

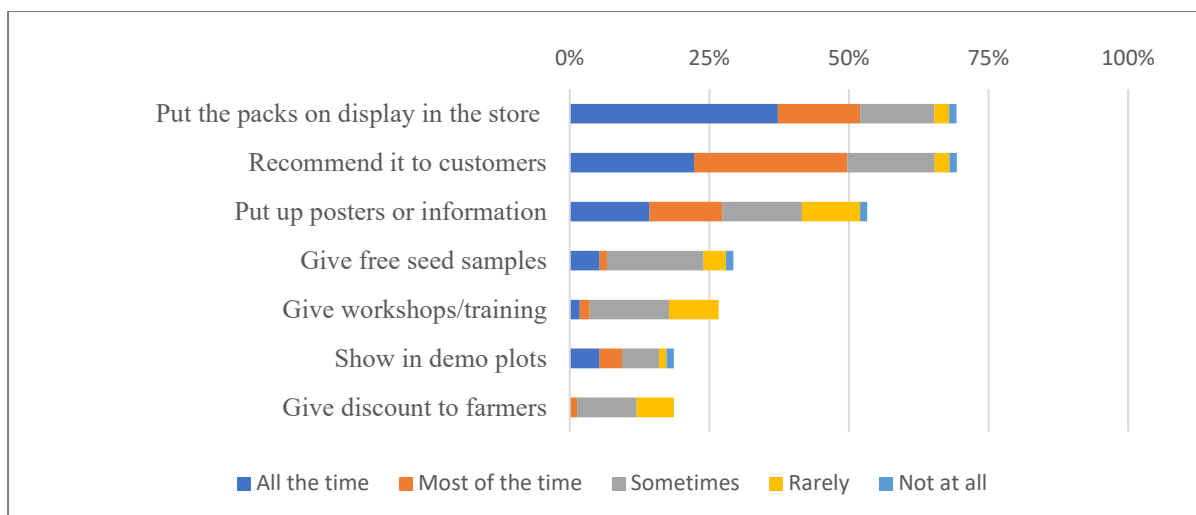


Figure 6: Agro-dealer actions for promoting new varieties

#### 4 Conclusion

Agro-dealers play a crucial role in maize seed systems and varietal turnover but have been often neglected in previous research endeavors that investigated varietal turnover. By juxtaposing the views of farmers and agro-dealers on this issue, our work succeeded in getting a more complete picture of barriers and opportunities that arise at the agro-dealer level for varietal turnover. While farmers do switch between maize seed varieties, the offer they have access to at the agro-dealer is dominated by older varieties. Newly developed varieties are not being picked up in dissemination networks. As agro-dealers base themselves on farmers preferences and requests, there is very limited room to influence current systems and break the status quo.

However, taking into account the strong position of agro-dealers as a reliable information source for farmers and an influencing factor in varietal turnover, its potential to introduce new varieties has been strongly underutilized. Seed companies should capitalize on the role agro-dealers have in rural communities and use them much more as a vehicle for change. While several promotion campaigns are possible through agro-dealers, current activities have been fairly limited. And putting a new variety in store without any promotional support will not be enough to convince agro-dealers to promote it or farmers to pick it up. On the other hand, only relying on demo-plots, which is still one of the most popular marketing tools among seed companies, is not enough to bring change in purchase habits. More research is necessary to investigate which marketing mix is most optimal and cost-effective to change not only farmer but also agro-dealer preferences for new maize varieties.

## References

- Abate, T., Fisher, M., Abdoulaye, T., Kassie, G. T., Lunduka, R., Marenya, P., & Asnake, W. (2017). Characteristics of maize cultivars in Africa: How modern are they and how many do smallholder farmers grow? *Agriculture & Food Security*, 6(1), 30.
- Adesina, A., Langyintuo, A., Bugo, N., Makinde, K., Bigirwa, G., & Wakiumu, J. (2014). Improving farmers' access to agricultural inputs and finance: approaches and lessons from sub-Saharan Africa. In P. Hazell & A. Rahman (Eds.), *New Directions for Smallholder Agriculture*: Oxford Scholarship Online.
- Allgood, J. (2011). *Agrodealer Development in Developing and Emerging Markets*. Paper presented at the AIARD Annual Conference 2011, Washington, DC.
- Alliance for a Green Revolution in Africa. (2017). *Seeding an African Green Revolution: The PASS Journey*. Nairobi, Kenya: AGRA.
- Bayesian Consulting Group Limited. (2016). *Agrodealer baseline study - final report*. Nairobi, Kenya.
- Burke, T. (2016). *Agricultural technology delivery experience: Legume seed and last mile smallholders*.
- Christinck, A., Rattunde, F., Kergna, A., Mulinge, W., & Weltzien, E. (2018). "You can't grow alone"- Prioritized sustainable seed system development options for stable food crops in Sub-Saharan Africa: cases of Kenya and Mali.
- De Groote, H., Doss, C., Lyimo, S., & Mwangi, W. (2002, December 8-10, 2002). *Adoption of maize technologies in East Africa—what happened to Africa's emerging maize revolution*. Paper presented at the FASID Forum V, "Green Revolution in Asia and its Transferability to Africa", Tokyo.
- Erenstein, O., & Kassie, G. T. (2018). Seeding eastern Africa's maize revolution in the post-structural adjustment era: a review and comparative analysis of the formal maize seed sector. *International Food and Agribusiness Management Review*, 21(1), 39-52.
- Evenson, R. E., & Gollin, D. (2003). Assessing the Impact of the Green Revolution, 1960 to 2000. *Science*, 300(5620), 758-762.
- FAO. (2019). *GIEWS Special Alert No. 345 - East Africa*. Retrieved from Rome:
- Hassan, R. M. (1998). *Maize Technology Development and Transfer: A GIS Application for Research Planning in Kenya*. Wallingford, UK: CABI, CIMMYT, KARI.
- Hassan, R. M., Njoroge, K., Njore, M., Otsyula, R., & Laboso, A. (1998). Adoption patterns and performance of improved maize in Kenya. In R. M. Hassan (Ed.), *Maize Technology Development and Transfer: A GIS Application for Research Planning in Kenya* (pp. 107-136). Wallingford, UK: CABI, CIMMYT, KARI.
- Hoogendoorn, J. C., Audet-Bélanger, G., Böber, C., Donnet, M. L., Lweya, K. B., Malik, R. K., & Gildemacher, P. R. (2018). Maize seed systems in different agro-ecosystems; what works and what does not work for smallholder farmers. *Food Security*, 10(4), 1089-1103.
- Langyintuo, A. S., Mwangi, W., Diallo, A. O., MacRobert, J., Dixon, J., & Bänziger, M. (2010). Challenges of the maize seed industry in eastern and southern Africa: A compelling case for private–public intervention to promote growth. *Food Policy*, 35(4), 323-331.
- Lipton, M., & Longhurst, R. (1989). *New Seeds and Poor People*. London: Routledge.
- Makinde, K., & Muhhuku, F. (2017). Getting improved seeds to smallholder farmers through agro-dealer networks. In *Seeding an African green revolution: The PASS journey* (pp. 89-107). Nairobi, Kenya: AGRA.
- Odame, H., & Muange, E. (2011). Can agro-dealers deliver the green revolution in Kenya? *IDS Bulletin*, 42(4), 78-89.
- Odendo, M., De Groote, H., Wanyama, J., Bett, C., & Ouma, J. (2007). *Analysis of the maize seed and fertilizer market in Kenya: a survey of stockists*. Paper presented at the African Crop Science Conference Proceedings, El-Minia, Egypt.
- Okello, B., Paruzzolo, S., Mehra, R., Shetty, A., & Weiss, E. (2012). *Gender and economic growth in Kenya: Unleashing the power of women*. Retrieved from Nairobi, Kenya:
- Smale, M., & Olwande, J. (2014). Demand for maize hybrids and hybrid change on smallholder farms in Kenya. *Agricultural Economics*, 45(4), 409-420.
- Spielman, D. J., & Smale, M. (2017). *Policy options to accelerate variety change among smallholder farmers in South Asia and Africa South of the Sahara*. Retrieved from Washington, D.C. :

The World Bank. (2013). *Agribusiness Indicators: Kenya*. Washington D.C.

Toenniessen, G., Adesina, A., & DeVries, J. (2008). Building an alliance for a green revolution in Africa. *Annals of the New York Academy of Sciences*, 1136, 233-242.

USAID. (2010). *Staple foods value chain analysis: Country report - Kenya*.