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'NASPOT 12 O' and 'NASPOT 13 O' Sweetpotato

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Two sweetpotato [*Ipomoea batatas* L. (Lam.)] cultivars, NASPOT 12 O (Namulonge sweetpotato 12 orange-fleshed) and NASPOT 13 O (Namulonge sweetpotato 13 orange-fleshed) were approved for release by the Ugandan Plant Variety Release Committee (UPVRC) in Nov. 2013 (Ssemakula et al., 2013). This brings to 22, the number of sweetpotato cultivars officially released between 1999 and 2013 by the National Sweetpotato Program in Uganda (Mwanga et al., 2011; Ssemakula et al., 2013). The two cultivars herein described and released in 2013, have high average storage root yields, 43.1 t·ha^{-1} ('NASPOT 12 O') and 27.8 t·ha^{-1} ('NASPOT 13 O') on station, and 14.9 t·ha^{-1} ('NASPOT 12 O') and 9.7 t·ha^{-1} ('NASPOT 13 O') on farm compared with the national on-farm average for Uganda of 4.5 t·ha^{-1} (FAOSTAT 2010; Low et al., 2009). The cultivars have acceptable root shape, high dry matter content (DMC) (>30%) with good-to-excellent consumer qualities. The cultivars also have moderate levels of field resistance to sweetpotato virus disease (SPVD) and alternaria bataticola blight. The two cultivars were bred targeting development of vitamin A–rich (biofortified) orange-fleshed sweetpotato (OFSP). OFSP have been shown to be both effective for increasing maternal and child vitamin A intake and status (Hotz et al., 2012; Ruel and Alderman, 2013). The potential of the two OFSP cultivars to contribute to food and nutrition security in Uganda and the developing world is high (Low et al., 2007; Ruel, 2001), especially where high dry matter and starchy sweetpotatoes are preferred. The cultivars can be used directly if adapted in similar agroecologies in sub-Saharan Africa and globally and/or used as parents in breeding programs to develop locally adapted cultivars that meet high dry matter consumer preferences.

Origin

Before release, 'NASPOT 12 O' and 'NASPOT 13 O' were code named SPK004/2006/1136 and NASPOT7/2006/292, respectively. SPK004 (released in 2004 as Kakamega) was the female parent, 2006 was the initial year of clonal selection, and 1136 was the genotype number. This clone was officially released as 'NASPOT 12 O' [NASPOT = Namulonge sweetpotato, 12 = serial number according to the UPVRC and the National Agricultural Research Organization (NARO) nomenclature, O = orange fleshed]. Similarly, 'NASPOT 13 O' is a progeny of the released cultivar, with 'NASPOT 7' first selected in 2006 as genotype number 292, and given the UPVRC/NARO serial number 12, and officially released as 'NASPOT 13 O'. Kakamega (SPK004) was the female parent of 'NASPOT 7'; therefore, 'NASPOT 7', 'NASPOT 12 O', and 'NASPOT 13 O' are genetically related.

The polycross block from which the two cultivars originated was established in 2005/2006 at Namulonge with 24 parents (Table 1). The 24 parents in the polycross block consisted of three released and three common Ugandan landrace cultivars, two bred released Ugandan cultivars, three Ugandan breeding lines, and introductions from Kenya (2), Peru (8), and Rwanda (3). 'NASPOT 12 O' and 'NASPOT 13 O' are progenies of 'Kakamega' as the female parent, but because seed was open pollinated, their male pedigrees are unknown. The parents were included in the polycross nursery for improvement or as sources of one or a combination of genes for combining desirable traits such as orange-fleshed roots (provitamin A), high dry matter (≥30%), resistance to SPVD and alternaria bataticola stem blight, and early maturity (3 to 4 months).

Description and Performance

The key standard morphological descriptors [International Potato Center (CIP), Asian Vegetable Research and Development Center, and International Board for Plant Genetic Resources, 1991] of the two released cultivars are listed in Table 2 and major differences are shown in Fig. 1. Both cultivars have semierect vines and vigorous growth. However, 'NASPOT 12 O' has dense foliage that suppresses aggressive weeds, and a balanced harvest index that makes it good for dual purpose use as animal feed and food (Claessens, 2009). The flower color in both cultivars is the same, pale purple limb with purple throat. Flowering and seed capsule set are sparse in both cultivars. Both cultivars have high storage root DMC (≥30%) and a dry texture with a sweet taste when cooked (Table 3). Storage root skin color is purple red in 'NASPOT 12 O' and cream in 'NASPOT 13 O'. The storage root flesh color in both cultivars is deep orange but the intensity varies with age of the roots, location, and agro–climatic factors such as soil type, and wet or dry season.

Ssemakula et al. (2013) presented the data for official release of the two cultivars in Uganda. Details of the release information include descriptions of pedigree, cultivar, test sites, materials and methods, planting materials, on-station and on-farm trials, planting and harvesting dates, pest and disease evaluation procedures, farmer selection, acceptability evaluation, experimental designs, stability analysis, determination of dry matter

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Table 1. Origin and main attributes of 24 sweetpotato parents in the polycross nursery at Namulonge in 2005/2006 that gave rise to lines from which 'NASPOT 12 O' and 'NASPOT 13 O' were selected.[z]

Parent	Origin of parent	Yr released/status	Desirable/undesirable trait
New Kawogo (CIP 441745)	Uganda/landrace	1995	HDM, high resistance to SPVD
Kyabafuruki	Uganda/landrace	Germplasm	High root yield, susceptible to SPVD
Otada	Uganda/landrace	Germplasm	HDM, HA
91/282-1-no. 1	Rwanda	Breeding line	High resistance to SPVD
316/3	Uganda	Breeding line	OF, HDM, high resistance to SPVD
91/282-1-no. 5	Rwanda	Breeding line	High resistance to SPVD
Beauregard (CIP 440132)	CIP/Peru	Germplasm	OF, susceptible to SPVD
316/2	Uganda	Breeding line	OF, High resistance to SPVD
Tainung 65 (CIP 440215)	CIP/Peru	Germplasm	OF, low dry matter
Tanzania (CIP 440166)	Uganda/landrace	1995	HDM, HA
Excel (CIP 440016)	CIP/Peru	Germplasm	OF, susceptible to SPVD
Karoti Dar es Salaam	CIP/Nairobi	Germplasm	OF, susceptible to SPVD
Zapallo (CIP 420027)	CIP/Peru	Germplasm	OF, LDM
Tainung 64 (CIP 440159)	CIP/Peru	Germplasm	OF, LDM, susceptible to SPVD
NASPOT5/58	Uganda	Breeding line	OF, HDM, high resistance to SPVD
Huarmeyano (CIP 420020)	CIP/Peru	Germplasm	High resistance to SPFMV
NASPOT 1 (CIP 191133.1)	Uganda/bred	1999	HDM, HA, susceptible to alternaria bataticola blight
SPK004 (Kakamega) (CIP 441768)	Kenya	2004	OF, HDM
CC89.14.74 × OP (CIP 199004.3)	CIP/Peru	Breeding line	OF, susceptible to SPVD
Siliki	Uganda/landrace	Germplasm	HDM, HA, susceptible to SPVD
Ejumula (CIP 443750)	Uganda/landrace	2004	OF, HA, susceptible to SPVD
NASPOT 7 (CIP 100200.1)	Uganda/bred	2007	OF, HDM, high resistance to SPVD
91/16–5	Rwanda	Breeding line	OF, susceptible to SPVD
Jewel (CIP 401562)	CIP/Peru	Germplasm	OF, susceptible to SPVD

[z]CIP = International Potato Center; HA = high acceptability; HDM = high dry matter; LDM = low dry matter; SPVD = sweetpotato virus disease; OF = orange fleshed; SPFMV= *Sweet potato feathery mottle virus*.

Table 2. Morphological descriptors of 'NASPOT 12 O' and 'NASPOT 13 O' released in Uganda in Nov. 2013.[z]

	Cultivar		
Descriptor	NASPOT 12 O	NASPOT 13 O	Dimbuka-Bukulula (local control)
Plant type	Semierect	Semierect	Spreading
		Vine pigmentation	
Predominant color	Green	Green with few purple spots	Green
Secondary color	Purple nodes	Absent	Absent
		Mature leaf shape	
General leaf outline	Triangular	Lobed	Triangular
Lobe type	Very slight (teeth)	Deep	No lateral lobes
Leaf lobe number	Five	Three	One
Shape of central lobe	Triangular	Lanceolate	Triangular
		Foliage color	
Mature leaf	Green	Green	Green
Immature leaf	Mostly purple	Green	Green
Petiole pigmentation	Green with purple at both ends	Green	Green
		Storage root	
Storage root shape	Round elliptic	Elliptic	Long irregular or curved
Surface defects	Longitudinal grooves	Longitudinal grooves	Shallow longitudinal grooves
Predominant skin color	Purple red	Cream	Cream
Flesh color	Dark orange	Dark orange	Cream
		Flowering	
Flowering habit	Sparse	Sparse	Sparse
Stigma exertion	Inserted	Exerted	Inserted
		Capsule	
Seed capsule set	Sparse	Sparse	Sparse

[z]Selected descriptors according to International Potato Center, Asian Vegetable Research and Development Center, and International Board for Plant Genetic Resources Descriptors (1991).

and beta-carotene, corresponding results, and cultivar maintenance. The following description is a summary of the cultivar release results. The released cultivars were tested for six seasons (Uganda has two rainy seasons per year when sweetpotatoes can be grown) on station and on farm during 2011 to 2013 in replicated, standard multilocation yield trials in 1) the warm, subhumid short grasslands where sweetpotato weevils and drought are important and frequent; 2) the warm, moist, tall grasslands where SPVD pressure is high; and 3) the cool, moist, southwestern highlands where alternaria bataticola blight and low soil fertility problems are widespread. A total of eight multilocational on-station trials were conducted for four seasons, followed by 100 on-farm trial evaluation for two seasons under rain-fed conditions. The cultivars were routinely evaluated for resistance to SPVD, alternaria bataticola blight, and sweetpotato weevils, *Cylas puncticollis* (Boheman) and *Cylas brunneus* (Fabricius) (Table 3). Classification of the relative resistance to disease and weevil damage was based on field evaluation under natural disease pressure and weevil populations in each agroecology. Storage root DMC, root yield, taste, and desirable agronomic attributes (such as earliness, root size, and shape) were also evaluated (Table 3). Data were subjected to analysis of variance using SAS statistical package (SAS V9.1; SAS Institute, Cary, NC). Treatment means were separated where appropriate, using Fisher's least significant difference test.

Results of the performance of the cultivars on station and on farm including palatability are presented in Tables 4 and 5. Both 'NASPOT 12 O' and 'NASPOT 13 O' have higher storage root and biomass yield, higher