
وقل
اعملوا
فسيرى الله عملكم
ورسوله والمؤمنون

Potato production and its improvements, achievements and constraints

Ramzy El-Bedewy

Agriculture Research Center, ARC-Egypt

International Potato Center (CIP)

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World potato production, 1997-2007

	1997	1999	2001	2003	2005	2007
Countries	Million tones					
Developed	174	165	166	160	159	159
Developing	129	136	146	153	160	166
WORLD	303	301	312	313	319	325

Top ten Potato producers, 2007

Countries	Quantity (millions)
China	72
Russian Fed.	36
India	26
United States	20
Ukraine	19
Poland	11
Germany	11
Belarus	8
Netherlands	7
France	6

Source: FAOSTAT

Top potato consumers, 2005

Countries	Quantity (million t)		Kg per capita
China	47	Belarus	181
Russian Fed.	18	Kyrgyzstan	143
India	17	Ukraine	136
United States	17	Russian Fed.	131
Ukraine	6	Poland	131
UK	6	Rwanda	125
Germany	5	Lithuania	116
Poland	5	Latvia	114
Bangladesh	4	Kazakhstan	103
Iran	3	UK	102

Source: FAOSTAT

Africa

Top producers, 2007

1 Egypt	2 Malawi	3 South Africa	4 Algeria
5 Morocco	6 Rwanda	7 Nigeria	8 Kenya
9 Uganda	10 Angola	11 Ethiopia	

Production, 2007	
Harvested area	1 541 000 ha
Quantity	16 000 000 t
Yield	10.8 t/ha

Source: FAOSTAT

Objectives

- In Africa, there is a big gap between the supply and demand of good quality potato seed.
- An urgent need of production of significant quantities of good quality seed.
- Clean seed has to be produced from LB resistant varieties in absence of BW, be free from viruses, and in proper physiological condition using proper cultural practices

Constraints to Potato Production in Africa (SSA, CA and WA)

- Lack of access to clean seeds, high cost
- Lack of quality control (certified seed)
- Low yields (5-8 t/ha), low multiplication rate 1:5
- Lack of access to inputs
- Poor infrastructure, lack of good storage
- Pests
- Private seed companies shy away

What are the most important pests that affect seed quality in Africa?

Late Blight (LB)

- Most important potato constraint world wide.
- Yield losses of approximately $ 2.8 Billion annually.
- $ 850 million spent annually for fungicide application.

Available sources of LB host plant resistance

Population A	Population B
Vertical	Horizontal
Few R-genes	Many minor genes
High infection rate	Low infection rate
Easily overcome	Difficult to overcome

LB resistant germplasm can be introduced from CIP in various forms

- True potato seed (TPS)
- Tuber families
- In-vitro plant-lets
- Varieties/clones

Wide Variability on CIP Potato Germplasm

Blight Resistant Varieties in SSA, CA and WA

- European Varieties have good yield and quality, never bred for resistance, depend on spray– most var. introduced in ’80s gone.
- CIP-germplasm are mostly the source of LB resistance (more than 35 CIP clones have been released by various NARS over the past 25 years, ten of them released recently).
- 45 advanced CIP-clones of “Population B” have been already developed. (the selection of promising clones with acceptable yield and agronomic characteristics under different agro-ecological zones is still going on by different African NARS).

Bacterial Wilt

Major constraints to potato production in most developing countries:

- **Clean seed, soil free of *R.S*., cultural practices & sanitation are still the most effective control measures.**
- **So far no resistant varieties/clones have been found.**
- **Selection possibility for low susceptibility.**

Potato Viruses

- PLRV and mosaic diseases
- Crop losses from 10 to more than 60%
- Suitable growing period
- Healthy seed, aphid control
- Rouging of diseased plants, haulm killing, early harvest and Resistance/tolerant varieties & clones

PTM

Crop losses from 10 to more than 60%

Control:

- Use of healthy clean seed.
- Cultural practices, irrigation, ridging, suitable planting and harvesting date.
- Use of safe biological control measures Bt+ & G.V.
- Use of GMO??

Collaborators in potato seed & breeding activities

National Agricultural Research Institutions

Governmental, NGOs and Seed producers.

Universities, National and International institutions and seed Companies etc.

PRAPACE and SARRNET Networks

North Africa Network??

Performance of some selected clones of (*Population A)* at Loreto (2200m), SSA, long rains 2001 & 2002

Clone	2001		2002	
	Yield (t/ha)	AUDPC	Yield (t/ha)	AUDPC
390381.32	43.0	437	49.9	605
KP90185.2	37.6	740	47.9	760
390012.2	32.1	633	40.0	378
KP90154.1	32.1	255	39.0	121
390831.4	32.1	847	38.2	450
KP90121.1	26.4	770	44.7	292
Tigoni	31.9	936	37.2	324
Desiree	29.1	2674.0	30.2	1258
$LSD_{(0.05)}$	6.6	15	19.4	293

Performance of some selected clones of (*Population B*) at Loreto (2200m), SSA, long rains 2001 & 2002

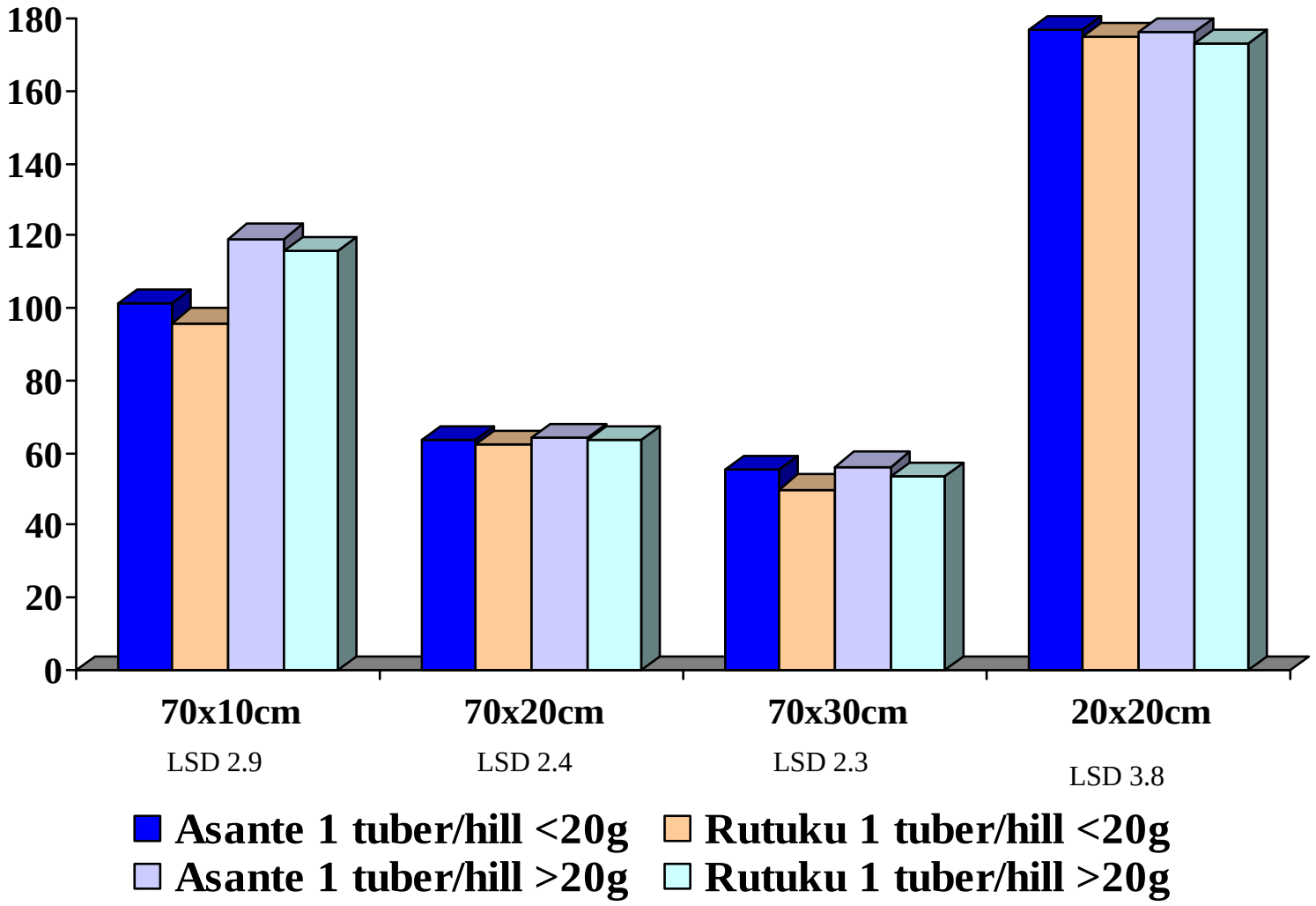
Clone	2001		2002	
	Yield (t/ha)	AUDPC	Yield (t/ha)	AUDPC
392640.28	49.4	252	59.7	102
392640.13	41.8	595	50.1	101
392640.21	35.2	720	47.8	117
391058.90	34.6	792	37.2	111
391058.91	30.8	530	41.7	109
Tigoni	23.4	1041	33.2	168
Desiree	12.8	2674	20.8	258
$LSD_{(0.05)}$	5.3	300	25.4	98

Selected Top clones for French fries in SSA

Clone	DM %	Specific gravity	Overall acceptability
Danva	25.5	1.106	6.3
379055.1	23.3	1.066	5.4
387205.5	23.3	1.064	5.4
389746.2	22.0	1.081	5.0
386040.9	21.7	1.084	5.1

[1] On scale of 1-9; scores of 5.0 and above are acceptable.

Relationship between planting density and tuber size on tuber number on varieties Asante and Rutuku in Kenya and Uganda, 2002-2003



Multiplication strategy

- CIP and NARIs producing the nuclear seed stock from in-vitro plant-lets in their TC Lab as well as producing foundation seed from stem cuttings and mini-tuber propagation in their screen houses and control nursery beds.
- NARIs, NGOs and seed growers producing pre-basic and basic clean seed for further distribution.

Seed Source and distribution channels in SSA, CA & WA

- **Formal: CIP/KARI, ARC in SSA and Governmental NARI stations (less than 1%).**
- **Regulated informal seed production in potato seed growers' fields and NGOs (less than 4%)**
- **Informal Seed: Neighbours, Markets etc (more than 95%)**

TPS: A Technology for small scale farmers in Africa

Performance of seedlings tuber production/m^2 in nursery, Kenya, LR 2002 and 2003

Progeny	2002		2003	
	Yield (kg/m^2)	No. of Tubers	Yield (kg/m^2)	No. of Tubers
MF II x 13	6.4	263	7.5	375
Serrana x 67	6.1	335	8.4	427
TPS 7 x 67	5.8	328	6.6	370
Atzimba x 13	5.7	380	7.8	365
MF I x 67	4.9	235	7.9	335
$LSD_{0.05}$	1.9	NS	2.0	NS

Values shown are means of three replications. Yield data shown are from a spacing of 10 x 10 cm.

Potato production from seedlings tuber progenies in Kenya LR Season, 2002 and 2003

Progeny	2002		2003	
	Yield (t/ha)	AUDPC (LB)	Yield (t/ha)	AUDPC (LB)
Achirana x 67	36.8	1020.3	44.7	124.3
Serrana x 67	38.1	1177.8	44.5	112.5
MF I x 13	39.4	1057.9	44.2	154.8
MF II x 67	42.3	1259.8	43.2	113.6
Tigoni	43.5	842.2	40.8	132.8
K. Pink	32.5	2128.7	27.8	197.8
$LSD_{.05}$	NS	284.5	14.8	NS

Values shown are means of three replications of 20 hills. Planting date: 07.04 and 12.04 in 2002 and 2003; Harvesting date: 14.7. and 28.07 in 2002 and 2003

Future prospects and challenges 1

- Strengthen foundation, pre-basic and basic seed production by NARS.
- Improve facilities, massive production of nuclear seed using hydroponics system.
- Emphasise more on further mini-tubers multiplication in high planting density.
- Strengthen varieties deployment & seed diffusion by NARI, NGO and encourage Private Sector to collaborate on seed production.

(2)

- Reach a happy compromise between formal and regulated informal seed system
- More emphasis on Pests control (LB,BW, Virus,PTM)
- Establishment of antisera production and distribution centre in Egypt.
- Utilization of TPS
- Use of GMO (PTM, Viruses etc)??
- More emphasis on marketing and promotion of good quality seed.
- More emphasis in capacity building & training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