Anticipated Demands and Challenges to plant Breeding and related Technologies into the Future.

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PANNAR
50 Years of Quality Seed

Anticipated Demands and Challenges to plant Breeding

INTRODUCTION

- The selection of plants to give higher yields with improved quality has formed the basis of plant breeding since man kind domesticated wild plants. The evolving constraints brought about by climate change and the need to feed a growing world population has brought about the current food crisis and therefore the need to significantly improve crop yields in a relatively short time. There is a rising demand that the seed industry and governments should utilize both current and new breeding technologies more efficiently by establishing achievement goals with the farmer at the centre (Fig No.1 shows Pannar Seed (Pty) Ltd corporate Breeding goals for hybrid maize.
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- Plant breeding on its own will not deliver the required food increase which will be accessible to the consumer unless with the support of related technologies such as transgenic technology, irrigation, electricity, plant and equipment, etc
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- Robynne M. Anderson summed it up well in her article “Putting Farming first” (Seed World 2009 Edition) by saying that “the approach starts by focusing on farmers, the tools and information they need to steward land, grow crops, bring in their harvest and then get it to market. New investments, incentives and innovations are needed to achieve greater sustainability while delivering increased agricultural production”.
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- The above quotes and the seed industry corporate breeding goals as stated above sum up the demands, challenges and opportunities of the past, the present and future for global agriculture and plant breeding in particular.

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CORPORATE BREEDING GOALS

Figure No.1

ULTRA EARLY/DROUGHT TOLERANT	
EARLY/DROUGHT TOLERANT	PAN 4M-19
EARLY	PAN 6363
MEDIUM	PAN 67,53
LATE HIPO	PAN 61,6777
VERY LATE	PAN 69,7M-89
ULTRA LATE	PAN 691,683

2.0 ANTICIPATED DEMANDS
2.1 CHANGING FARMERS' NEEDS

- Farmers are at large becoming more specific in their demands for farm inputs. This has been brought about by the hostile environments they have to operate under and the need to achieve higher operational efficiency if they have to attain economic viability.
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- The seed industry has the task of packaging the farmers' specific needs both in terms of product and information. The seed industry has to provide adequate information on the performance of products under a wide range of ecological environments (Figs. No.2 and 3) give product performance under low to high potential growing conditions)
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- Under the diverse ecological conditions faced by the farmer, the seed industry is guided by the following breeding goals-
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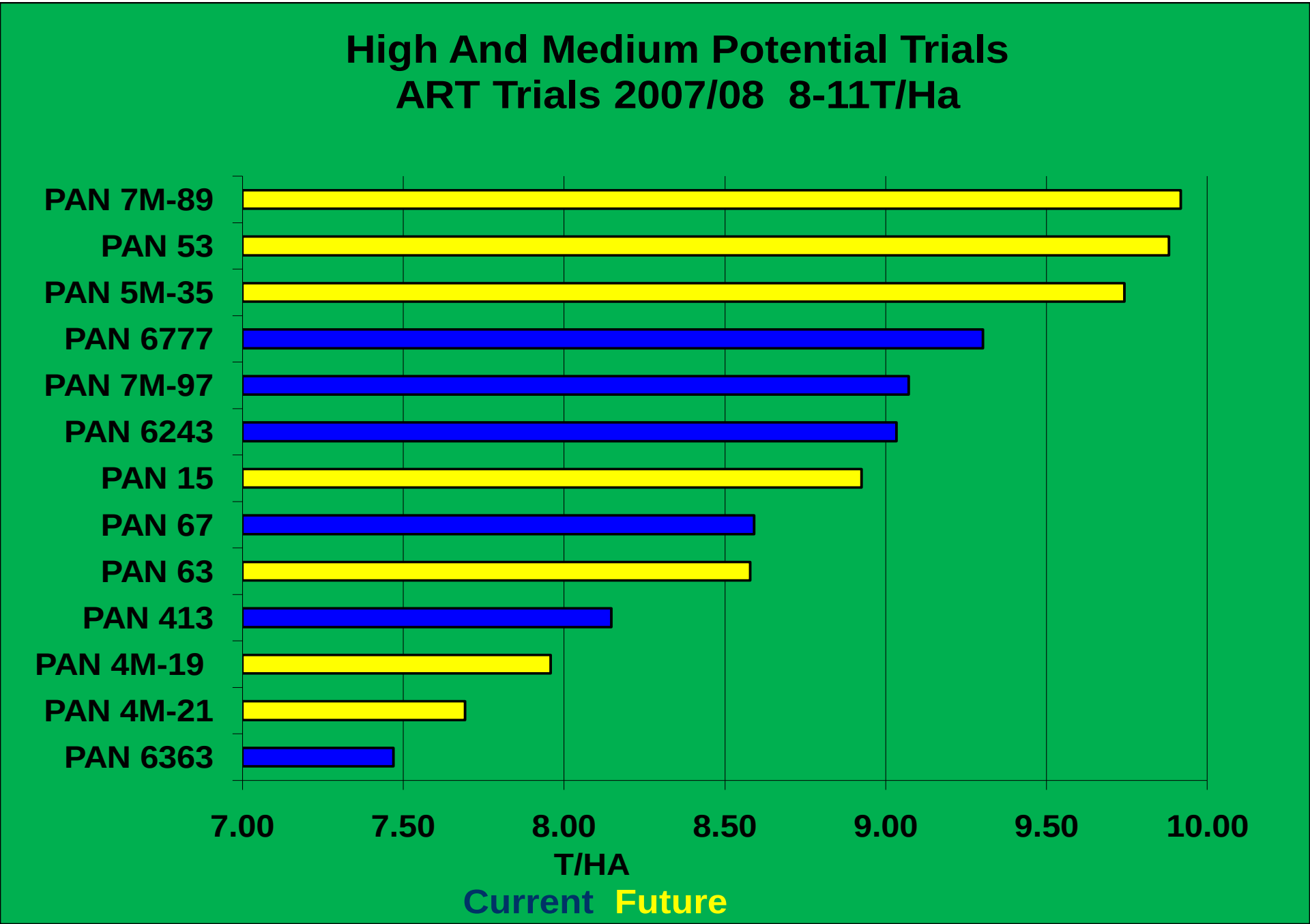
- Developing varieties of all maturities from ultra early to ultra late.
- Provide varieties that will perform well in major production areas, across seasons and circumstances (erratic rainfall, heavy / late rains and high altitude)
- Develop varieties with sound agronomic traits (cob, leaf and stem disease resistance, standability and hard grain for storability at small scale farm level.)
- Pay particular attention to small scale farmers' needs (Provision of very early flowering and maturing varieties)

Figure No. 2


High And Medium Potential Trials
ART Trials 2007/08 8-11T/Ha
PAN 7M-89
PAN 53
PAN 5M-35
PAN 6777
PAN 7M-97
PAN 6243
PAN 15
PAN 67
PAN 63
PAN 413
PAN 4M-19
PAN 4M-21
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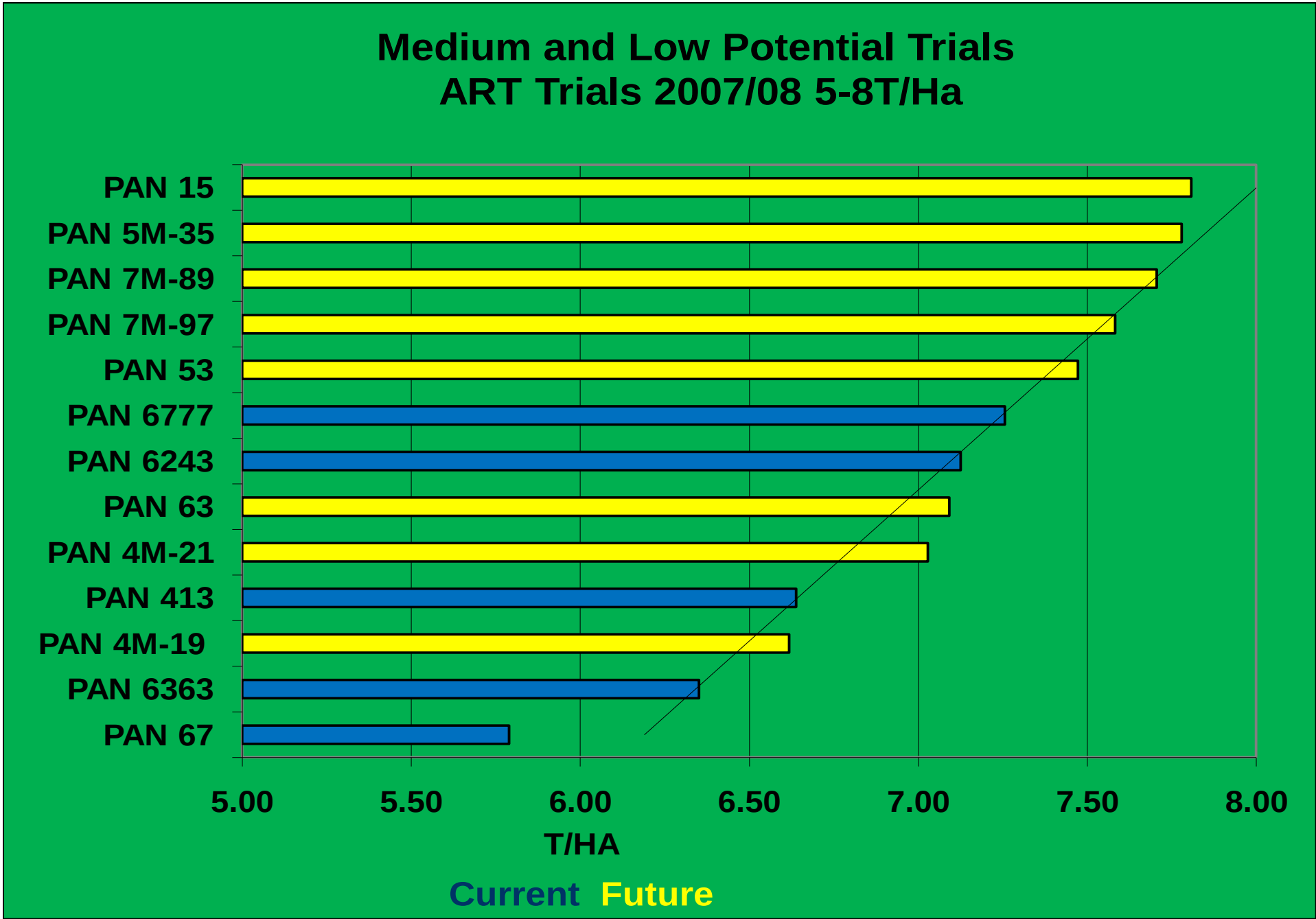
T/HA
Current
Future

Figure No.3


Medium and Low Potential Trials
ART Trials 2007/08 5-8T/Ha
PAN 15
PAN 5M-35
PAN 7M-89
PAN 7M-97
PAN 53
PAN 6777
PAN 6243
PAN 63
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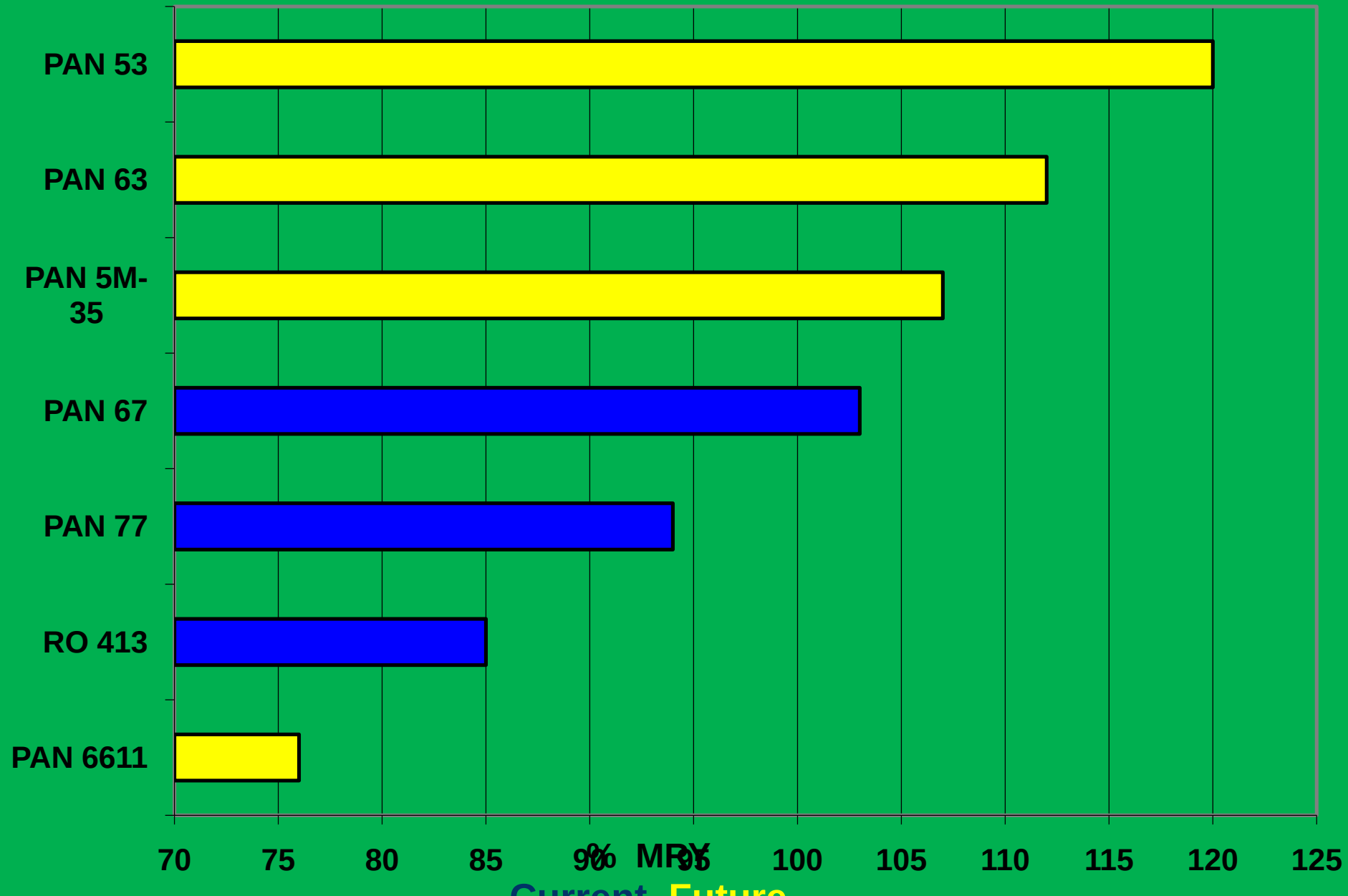
T/HA
Current
Future

3.0 CHALLENGES

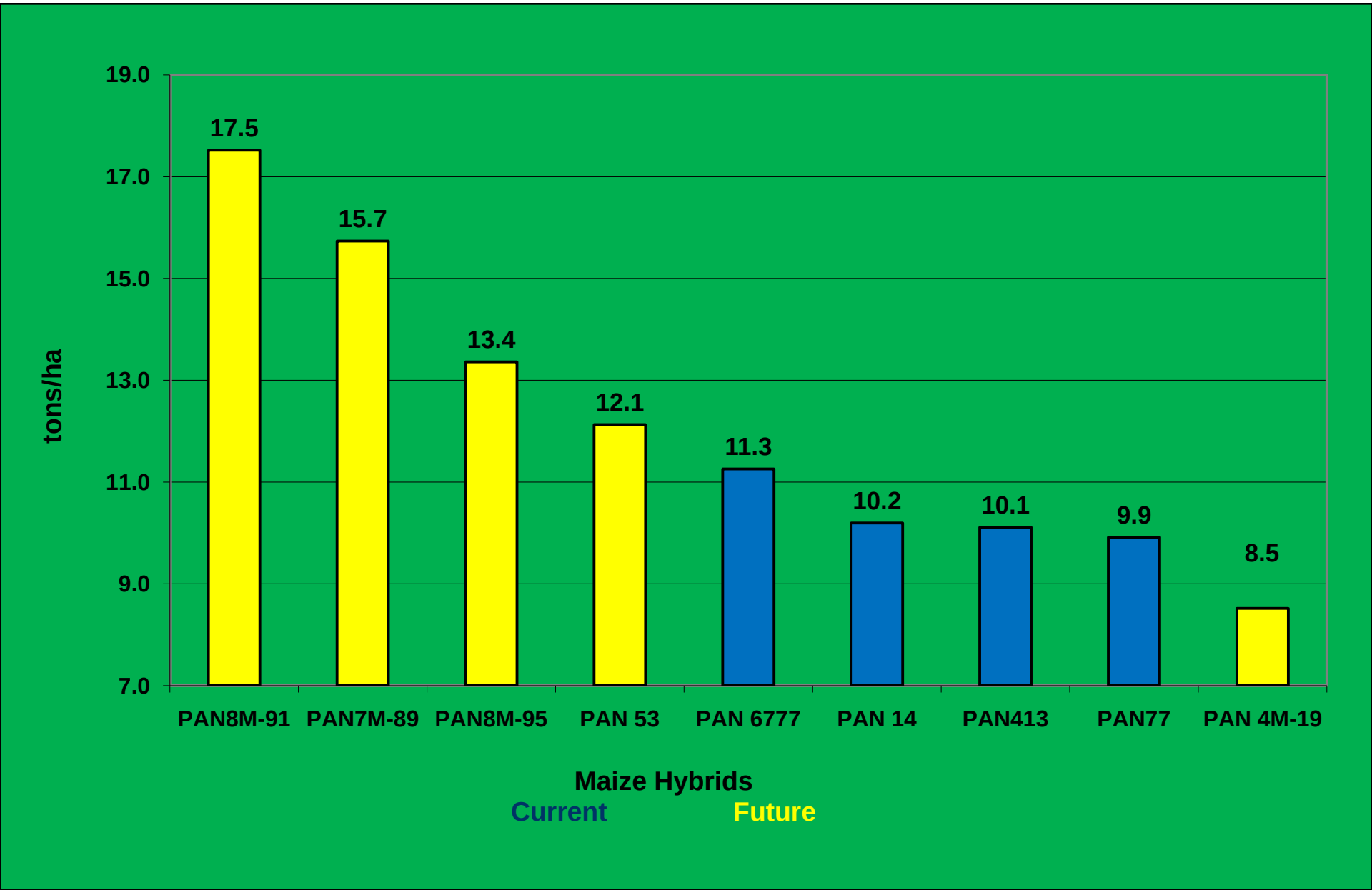
3.1 POPULATION GROWTH

- The World Population now at 6.8 billion will by 2050 reach 9.2 billion. It is becoming imperative that given a more and more hostile environment to contend with extra effort in plant breeding improvements and the use of supporting technologies will be required to produce more food. Figures No.4a, 4b and 4c show development and deployment of high yielding maize hybrids at all levels of maturities. It will be observed that new products achieve a significant increase, in mean relative yield, over current products.

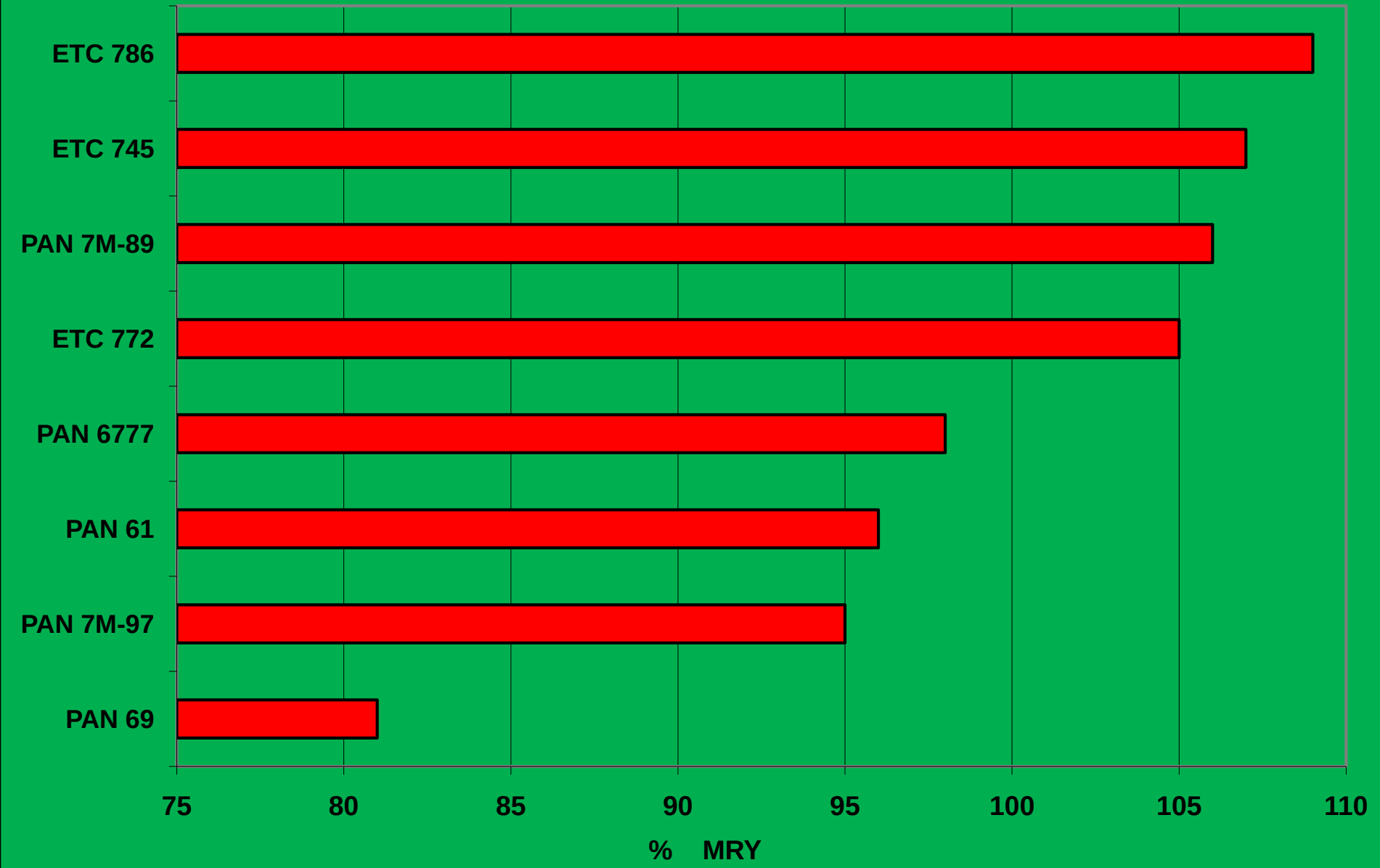
MEDIUM HYBRIDS >8t/Ha



Medium Rainfall-Commercial Hybrids



LATE /ADVANCED 3 YEARS<8T



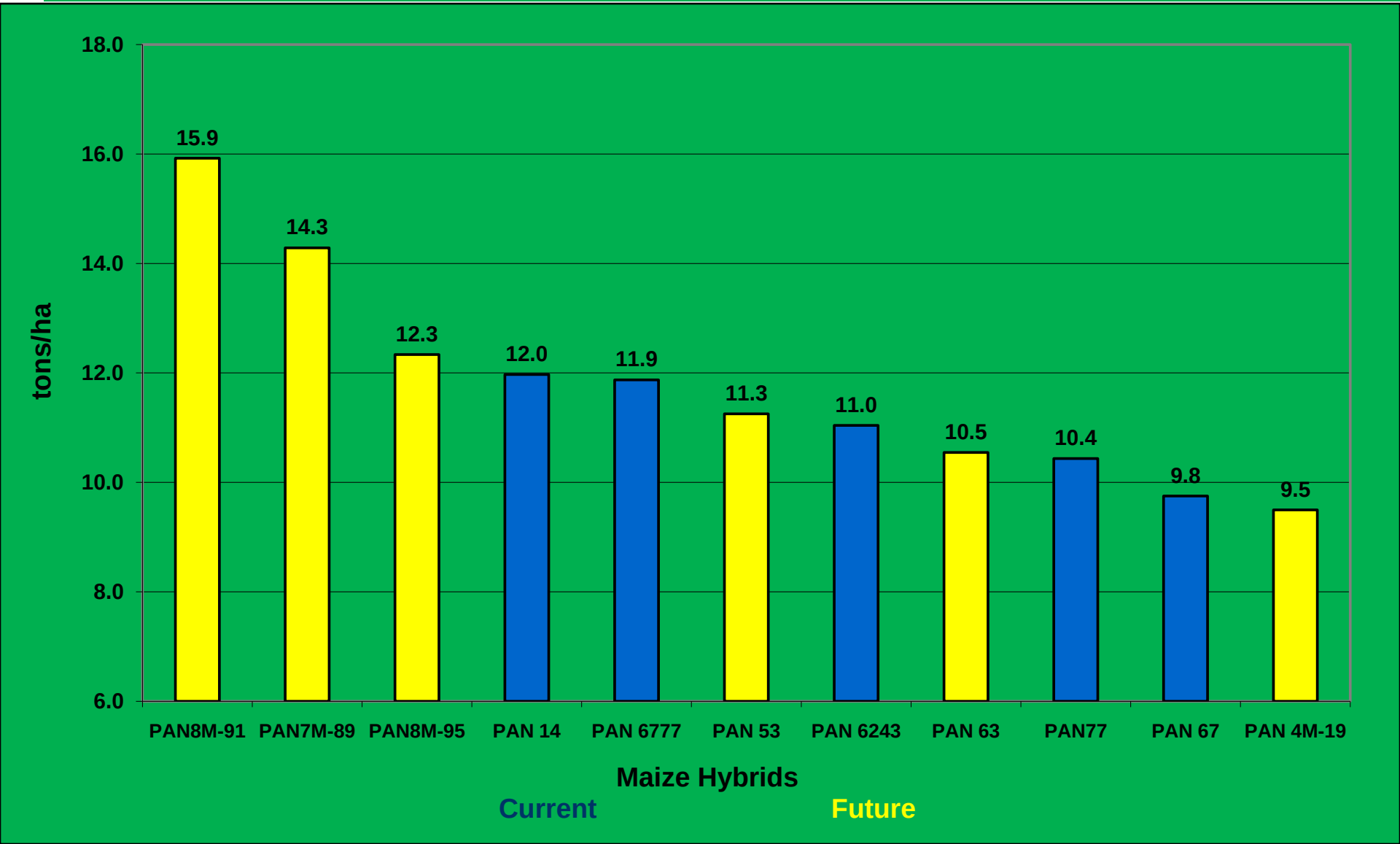
3.2 ACCESS TO SUITABLE GERPLASM

It is envisaged that within the diverse ecological diversity, new products will achieve better agronomic performance in addition to overall yield increase.

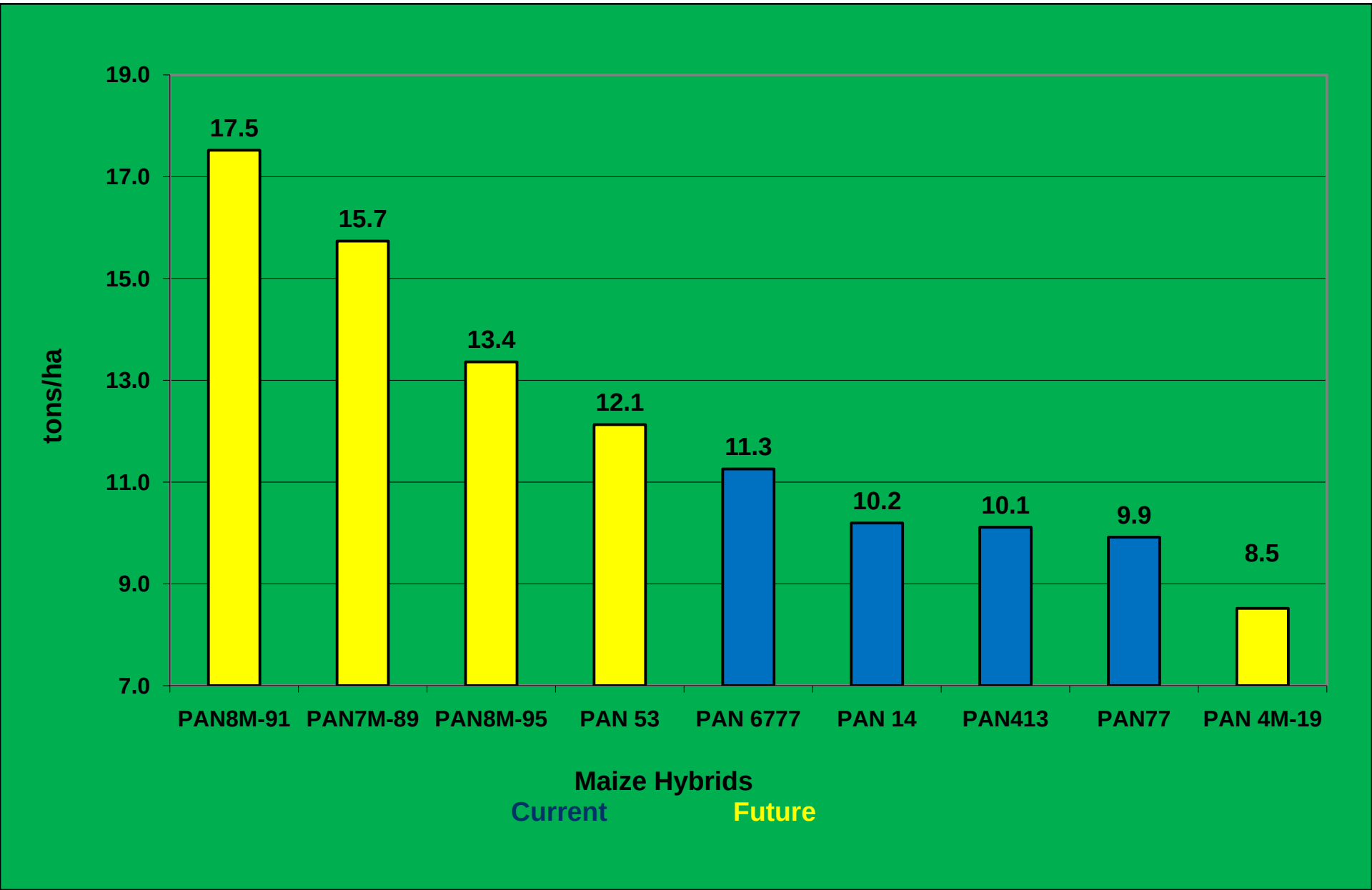
Stress factors such as drought, high temperature and high precipitation are being taken into consideration in breeding programs. Germplasm stability is critical and is seen in figures No.5 and No.6 Maize does better under medium rainfall conditions. Good performance, by the same products, under high or erratic rainfall conditions will mean expanding production areas.

High altitude areas are being brought into focus and suitable germplasm is being screened and introduced into production.

High Rainfall – Commercial Hybrids



Medium Rainfall-Commercial Hybrids



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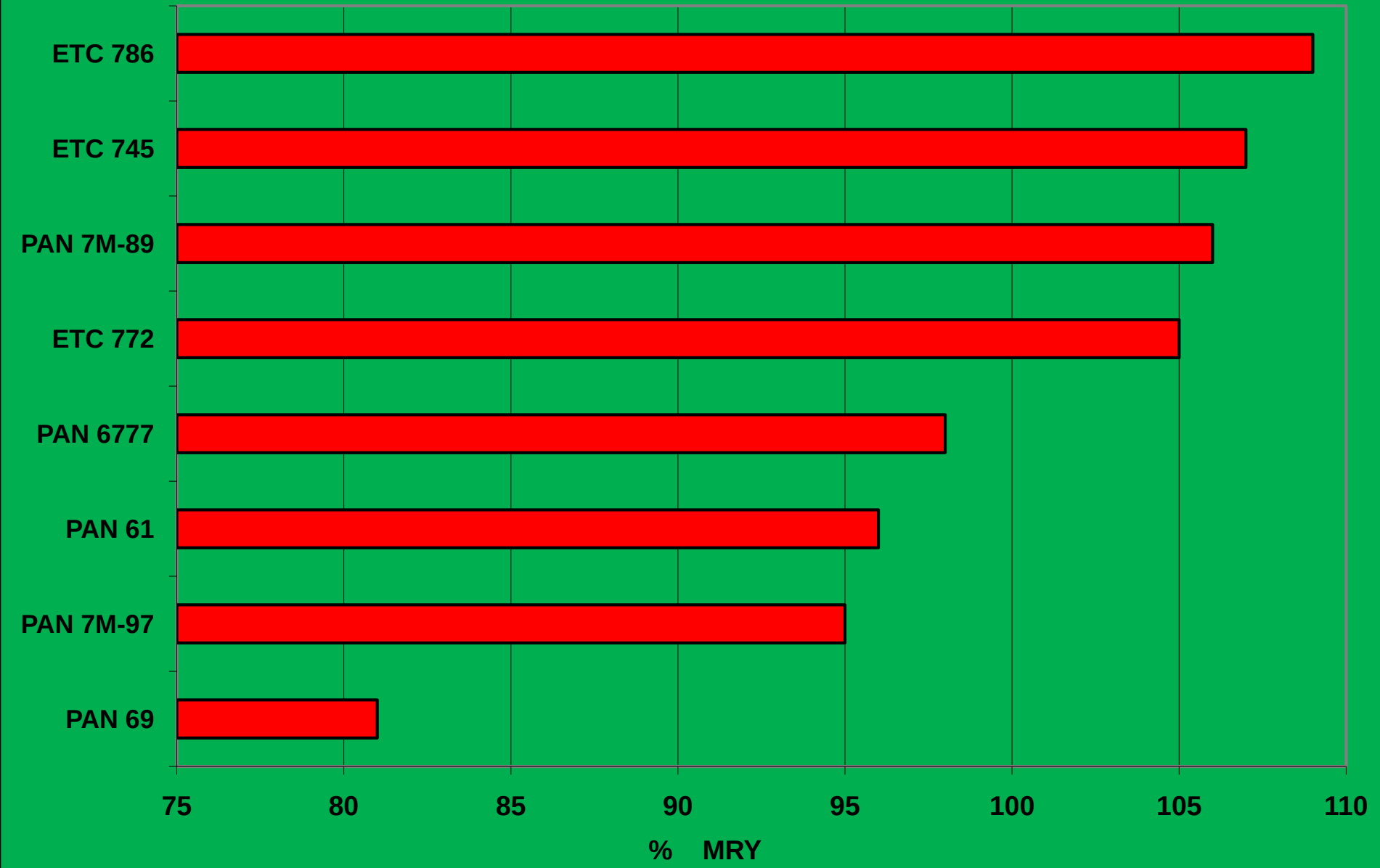


3.3 LOW SEED DEMAND AT FARM LEVEL

- It can be safely stated that the level of germplasm development currently available on the world market is capable to produce enough food for the existing population.

- In developing countries, now facing a food crisis, farmers are not readily adopting new improved varieties. Farmers are therefore being deprived of the benefits of the new products.

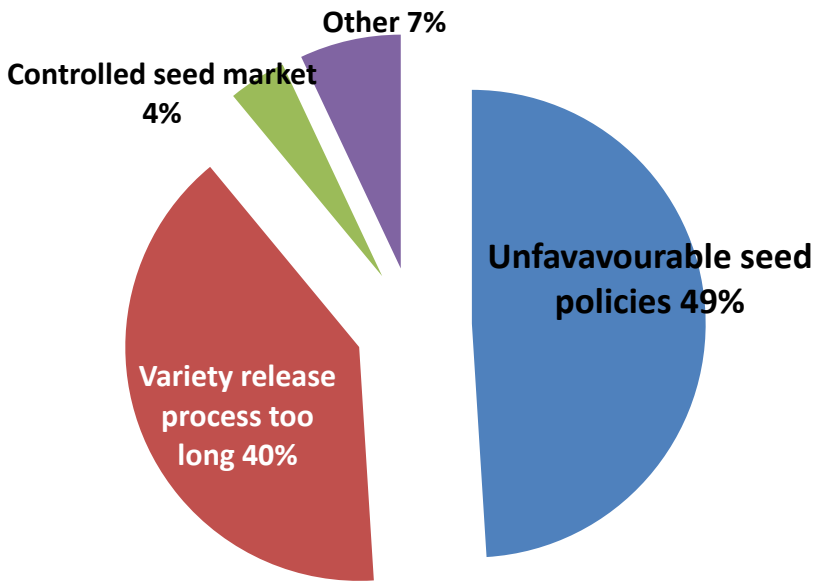
- Fig. No.7 shows low adoption rate of improved varieties in Eastern and Southern Africa. This is attributed to:
- Poor extension coverage not delivering up to date information on varieties and services.
- Farmers unaware of availability of improved varieties that can improve productivity.
- Farmers make decisions without awareness of varietal characteristics.
- Seed houses are unable to forecase seed demand
- Other factors such as poor access to credit and good markets disadvantage farmers in the developing world.

3.4 SEED CONTROL AND CERTIFICATION LEGISLATION

- Seed policy or the absence of it has in many instances, particularly in developed countries, impacted negatively on development of the seed industry and agriculture in general. Fig. No.8 illustrates the principal bottlenecks limiting the production and distribution of seed in Africa.

Fig no.8 Major Seed Policy Related Bottlenecks Hindering the production and distribution of seed in Africa

DTMA Seed sector survey 2007/8



- Many developing countries do not have well defined seed policy to guide development. In many instances private seed companies can not use their performance trials as part of the official variety release process. With financial constraints experienced by many public agencies, this restriction retards the speedy introduction of new varieties.
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- State control of seed markets is often regarded as protecting farmers' interests and national economies. Results have shown however that free trade works to the advantage of both the farmer and the national economy.
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- Many countries have not established accreditation to important international organizations such as the Organization of Economic Co-operation and Development (OECD), International Seed Testing Association (ISTA) etc. These countries find it difficult to access international markets. (Table 1 gives the position in Eastern and Southern Africa while table 2 shows the time lag to release a new variety on the market.)

Table no.1 Status of seed control legislation in Eastern and Southern Africa

DTMA Seed sector survey 2007/8

		Plant Variety	Variety	ISTA	OECD
	Seed Act	Protection	Registration	Accreditation	Accreditation
Eastern Africa					
Ethiopia	No	Yes	Yes	No	No
Kenya	Yes	Yes	Yes	Yes	Yes
Tanzania	Yes	Yes	Yes	No	No
Uganda	No	No	Yes	No	No
Southern Africa					
Angola	Yes	No	Yes	No	No
Malawi	Yes	No	Yes	Yes	Yes
Mozambique	Yes	Yes	Yes	No	No
South Africa	Yes	Yes	Yes	Yes	Yes
Zambia	Yes	Yes	Yes	Yes	Yes
Zimbabwe	Yes	Yes	Yes	Yes	Yes

3.5 GOVERNMENT AND DONOR MINDSET

- As stated earlier, there is adequate germplasm and information to enable the farmer produce enough food for the world population.
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- The mindset of many governments in developing countries is not responsive to market demands resulting in poor exploitation of natural, human and technological resources. In spite of the critical role agriculture plays in national economies, inappropriate investment is usually given to agriculture. Agriculture research is often the least of national priorities!
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- Some donor agencies are not long term development oriented and often do not operate in conjunction with local authorities. Valuable funds are spent on short term relief which does not add much value to long term sustainable development. Governments and donor agencies should therefore adopt Robynnes's approach and focus on educating the farmer, improve his/her operational efficiency by making available the right tools, finance and markets.

4. CONCLUSION

- It is gratifying that the seed stakeholders have mobilized themselves to anticipate the demands and challenges for plant breeding and are trying to find global response through the exchange of ideas like this 2nd World Seed Conference.
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- Developing countries should register a change in the mindset and elect on developing agriculture and adopt current and new technologies.
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- The adoption of progressive seed laws and regulations with effective harmonization of seed trade will improve farmers' access to improve seed.
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- Public-private partnership is not only essential but critical for the seed sector. The Indian Sub-Continent and South East Asia have experienced a higher growth rate in agriculture mainly because of the good cooperation between the public and private sectors.