



Biodiversity and Conservation

Implementation of the Cartagena Protocol on Biosafety in South Africa

22/11/2018



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



Presentation Overview

- Background
- Status of genetically modified (GM) products in South Africa (SA)
- Implementation of the Cartagena Protocol on Biosafety in SA
- Legislative Framework
- Regulatory Approach
- Risk Management Approach for SA
- Public awareness and Participation

Background

South Africa is the 3rd most biodiverse country in the world



2% of the world's land area

7% of the world's reptiles, birds and mammals



10% of the world's plants



15% of the world's coastal marine species



STATUS OF GM PRODUCTS IN SOUTH AFRICA

OVER THE PAST
FIVE YEARS ON
AVERAGE

In addition, many GM-derived medicines, including anti cancer agents, vaccines, insulin, cytokines and growth factors are on the South African market.



2.7 million hectares of GM crops were planted in South Africa.



90% of maize is GM (HT and/or IR)



95% of soybean is GM (HT)



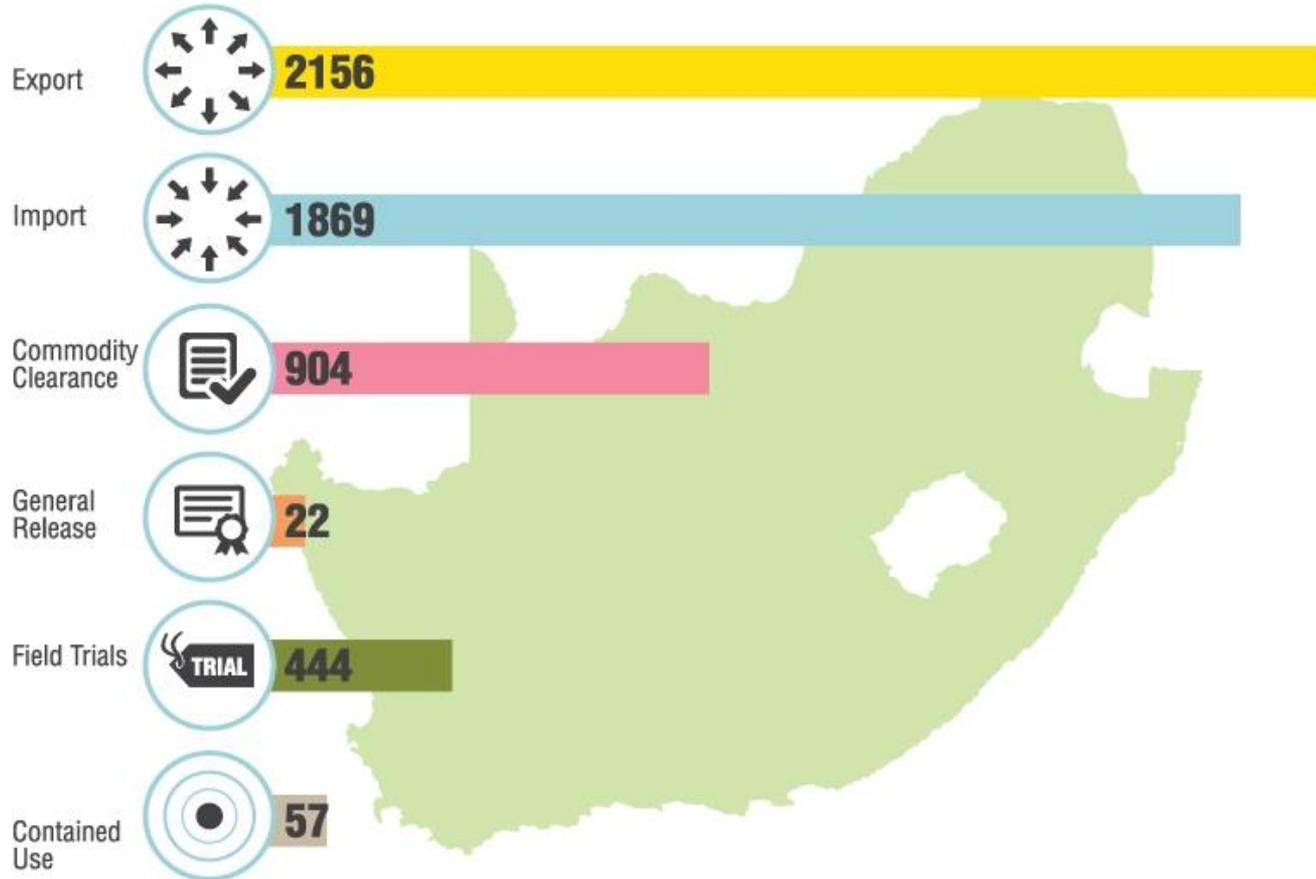
100% of cotton is GM (HT and/or IR)



Since 1999, **393** permits for confined field trials on 10 different crops have been issued.

IR - Insect resistant HT - Herbicide tolerant

NUMBER OF PERMIT TYPES ISSUED IN SOUTH AFRICA FOR THE PERIOD 1999-2017



IMPLEMENTATION: BIOSAFETY PROTOCOL IN SOUTH AFRICA

Progress towards Facilitating the establishment and further development of effective biosafety system

Acceded to the Protocol in 2003

DEA is the NFP

DAFF is the Competent National Authority (CNA)

- 2003, the Public Understanding of Biotechnology (PUB) programme, the Department of Science and Technology (DST)
- 2005, Integrated of biosafety activities into the NBSAP-1
- Development of Environmental Risk Assessment (ERA) Framework documents on:
 - Genetically modified crops (2008)
 - Genetically modified fish (2012)
 - Pharmaceutical crops (2015).
- Between 2008-2010, South Africa-Norway Biosafety Cooperation Project: a report on Monitoring the Environmental Impacts of GM Maize in South Africa
- 2010, Biosafety South Africa
- 2013, the Bio-economy Strategy
- 2015, Revised NBSAP

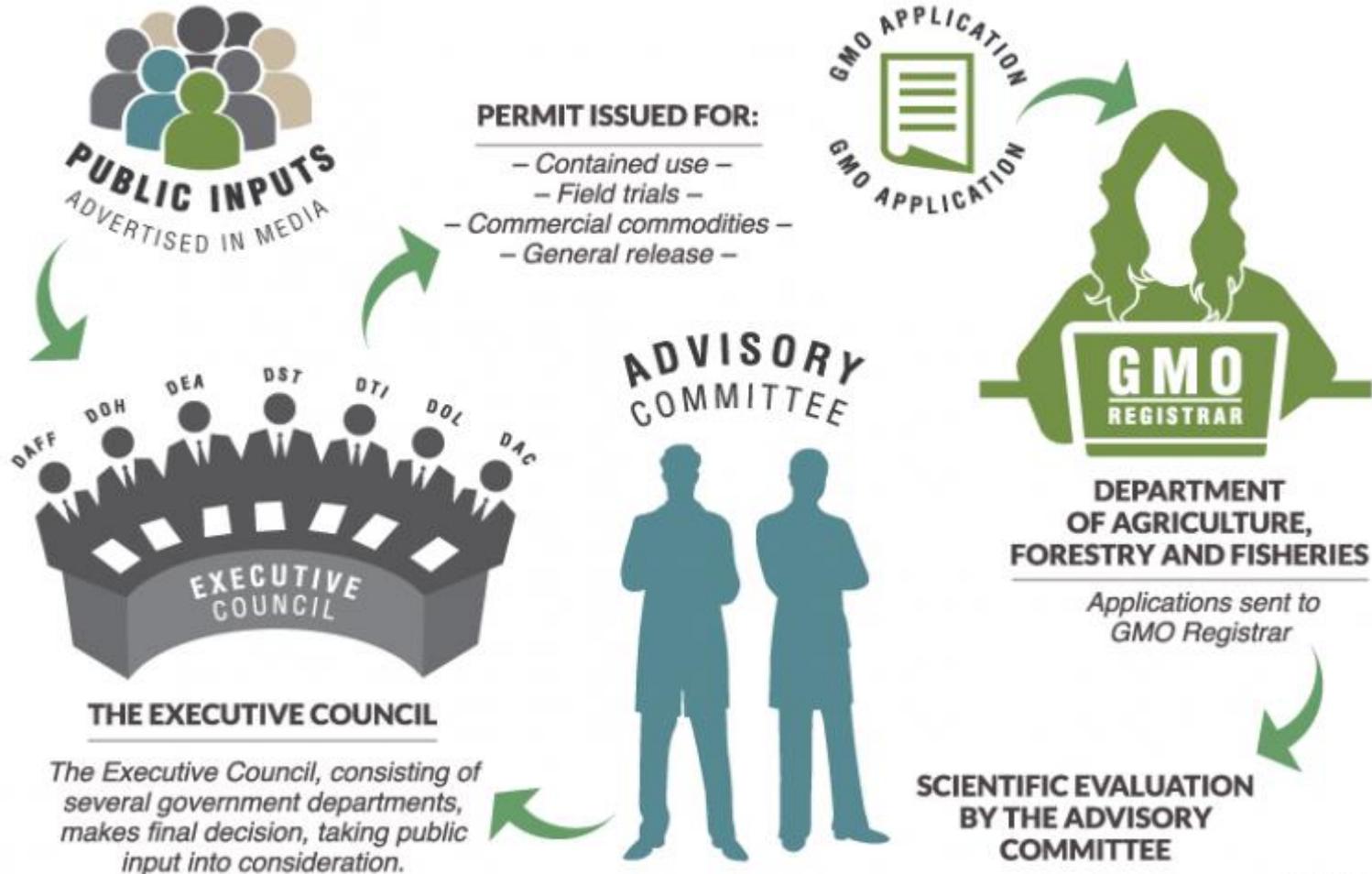
GMO LEGISLATIVE FRAMEWORK IN SA

POTENTIAL IMPACT	LEGISLATION	HOW THE LEGISLATION IS APPLIED
Human and animal health and safety	Foodstuffs, Cosmetics and Disinfectants Act	Defines labelling requirements for GM containing foods (Regulation 25, 2004).
	Occupational Health and Safety Act	Safeguards the health and safety of the workers, cleaning personnel and any other person, involved with activities with GMOs.
Environmental safety	National Environmental Management Biodiversity Act	Regulates possible impacts of GMOs on biodiversity and introduces minimum monitoring requirements, implemented through SANBI (South African National Biodiversity Institute).
	National Environmental Management Act	Provides general guidance with regards to the criteria that may trigger an EIA for GMOs, the objectives of such an EIA and the administrative procedure to follow
Socio-economic viability	Consumer Protection Act	Introduced mandatory labeling requirements for all GM goods (Regulation 293, 2008).

Genetically Modified Organisms (GMO) Act

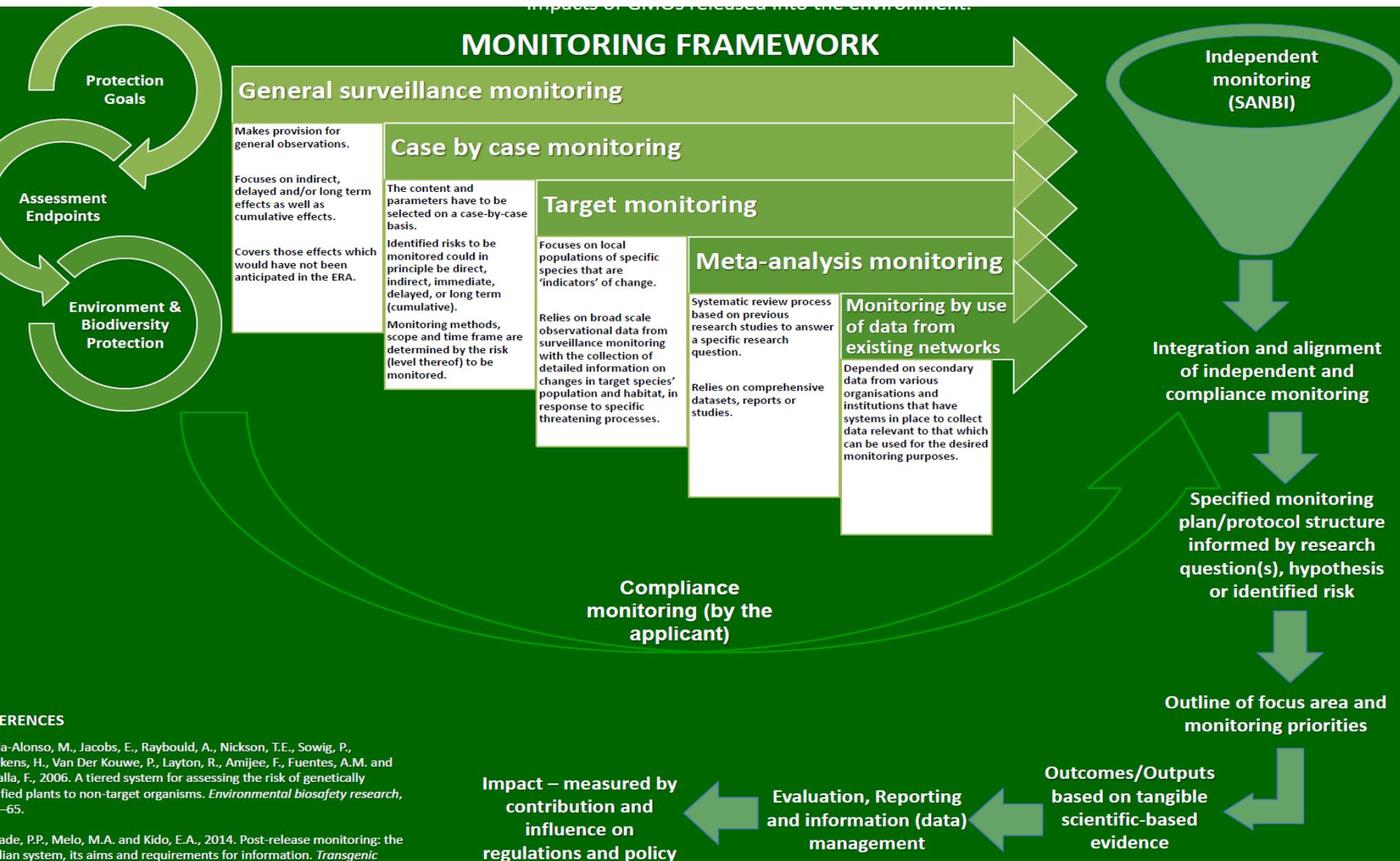
Provides for measures to promote the responsible development, production, use and application of genetically modified organisms

THE GMO PERMIT APPLICATION PROCESS



branding | gstudio.co.za

Risk Management approach for SA



Outreach and cooperation

School awareness activities



Capacity building



Universities



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Dinkolelers • Leading Minds • Dikgopolo fisa Dinkoleli



NORTH-WEST UNIVERSITY
YUNIBESITHI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT



UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

[More info please visit:](#)

<http://biosafety.org.za>

<https://www.pub.ac.za>

Examples of publications

GENOME EDITING - the what, how & why

Humans have harnessed this natural genetic variation over the ages, through selection and breeding programs, to improve crop plants and domesticated animals. We have also actively induced genetic variation using techniques such as random mutagenesis and genome duplications to introduce traits like higher yields, pest resistance and seedlessness.

Genetic variation is the basis of biological diversity

Harnessing genetic variation has led to superior crops & livestock

Genome editing enables the precise alteration of genetic codes

Genome editing is used to alter gene expression in specific ways

The genetic material (genome/DNA) of an organism codes for all the necessary molecular functions that underlie growth and development, and in doing so, determines the observable traits (phenotype) of an individual. Genetic codes are not stable, mutations and other variations occur naturally and are some times inherited by subsequent generations where these genetic variations result in altered traits.

Genome or gene editing refers to the practice of making precise changes to the genetic code of an organism in order to alter its phenotypic traits. A combination of naturally occurring molecular tools, e.g. CRISPR-Cas9, purposefully redesigned for every specific edit, and the cell's own DNA repair mechanisms are used to accurately identify, cut and repair the target sequence.

Genome editing techniques can be used to make small changes, similar to mutations that may also occur naturally, but more precisely, to disrupt, correct or modify gene activity. Alternatively, whole genes may be deleted or inserted. Inserted genes may originate from a sexually compatible organism (cisgenesis) or from a non-compatible one (transgenesis/genetic modification).

Disrupt Correct Gene deletion Gene insert

biosafety SOUTH AFRICA

sustainable biotech innovation

www.biosafety.org.za

GMP Booklet - Final (30 Sept 09).pdf - Adobe Reader

File Edit View Window Help

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Tools Sign Comment

GENETICALLY MODIFIED PLANTS: WHY AND HOW WE MEASURE RISK

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Loretta Steyn Graphic Design Studio & Southern Science - September 2009

10:58 AM 2018-09-11

Examples of publications

BIOTECHNOLOGY THROUGH THE AGES

THEY SAY THAT BIOTECHNOLOGY HAS BEEN AROUND FOR A LONG TIME.

BIOTECHNOLOGY?

YES. USING AND ADAPTING BIOLOGICAL PROCESSES TO MEET HUMAN NEEDS.

WELL, I SUPPLY LIKE EVERYTHING. IT HAD ITS EVOLUTION.

ACTUALLY, IT MAY HAVE BEEN BIT MORE LIKE THIS...

4000 - 2000 BC
YEAST IS USED IN EGYPT TO MAKE BREAD TO RISE. CHEESE AND WINE ARE MADE IN SUMERIA, CHINA AND EGYPT.

8000 BC
HUMANS BEGIN TO GROW AND KEEP LIVESTOCK. THE PLANTS AND ANIMALS BEGIN TO IMPROVE AS THE FARMERS SELECT THE BEST OFFSPRING TO BROW THE NEXT GENERATION.

1492
EDWARD TENNER BOOBS DOSES OF CONPOX TO A CHILD. THIS PREVENTS THE CHILD'S IMMUNE SYSTEM TO FIGHT A CANGARU VIRUS IN HUMANS CALLED SMALLPOX. A TREATMENT NOW KNOWN AS A "VACCINE".

1859
CHARLES DARWIN PUBLISHES HIS THEORY OF EVOLUTION THROUGH "NATURAL SELECTION". WITHIN 20 YEARS IT HAS INFLUENCED BIOLOGISTS, WITH MAJOR IMPACT ON PLANT AND ANIMAL BREEDS.

1865
GREGOR MENDEL, A MONK, DETERMINES THE RULES OF INHERITENCE. HE ASSERTS THAT FEATURES ARE PASSED FROM PARENTS TO THEIR OFFSPRING THROUGH CALLED GENES.

1866
THE "GENETIC CODE" IS WORKED OUT. THREE NUCLEOTIDE BASES DETERMINES EACH OF 20 COMMON AMINO ACIDS (THE BUILDING BLOCKS OF PROTEIN).

1928
SIR ALEXANDER FLEMING DISCOVERS THAT THE MOULD PENICILLIN KILLS CERTAIN BACTERIA. PENICILLIN IS LATER ISOLATED FROM THE MOULD, LEADING TO THE DEVELOPMENT OF ANTIBIOTICS.

1953
JAMES WATSON AND FRANCIS CRICK DESCRIBE THE DNA (DEOXYRIBONUCLEIC ACID) AS A DOUBLE HELIX COMPOSED OF JUST FOUR DISTINCT NUCLEOTIDE UNITS.

1959
STANLEY COHEN AND HERBERT BOYER TRANSFER DNA FROM ONE ORGANISM TO ANOTHER. THIS IS THE FIRST SUCCESSFUL TRANSFER OF GENES BETWEEN DIFFERENT INDIVIDUALS.

1972
THE DNA COMPOSITION OF HUMANS IS FOUND TO BE VERY SIMILAR TO THAT OF CHIMPANZEES AND MONKEYS.

1974
HERBERT GARDNER DEVELOPS A METHOD FOR DETERMINING THE SEQUENCE OF NUCLEOTIDES IN A DNA STRAND. THIS IS CALLED SEQUENCING.

1977
THE FIRST GOVERNMENT-APPROVED GENE THERAPY IN A HUMAN IS PERFORMED IN THE UNITED STATES. ON A FOUR-YEAR OLD GIRL SUFFERING FROM AN IMMUNE DEFECT.

1982
A SYNDROME IS DISCOVERED WHICH SEVERELY IMPAIRS THE IMMUNE SYSTEM. IT IS GIVEN THE NAME AIDS. ACQUIRED IMMUNE DEFICIENCY SYNDROME. IT IS CAUSED BY THE HUMAN IMMUNODEFICIENCY VIRUS, HIV.

1984
GENETIC FINGERPRINTING IS DEVELOPED. IT IS USED TO LINK A SUSPECT TO A CRIME SCENE.

1985
BACTERIA ARE GENETICALLY ENGINEERED TO PRODUCE A HUMAN FORM OF INSULIN FOR THE TREATMENT OF DIABETES. UNTIL THIS POINT, DIABETES SUFFERERS USED INSULIN FROM PIGS.

1986
THE FIRST GENETICALLY MODIFIED FOOD CROP IS APPROVED FOR COMMERCIAL PRODUCTION IN THE UNITED STATES. IT IS THE FLAVOR SAVY TOMATO AND IT IS ENGINEERED TO SLOW THE RIPENING PROCESS. THIS IMPROVING SHELF LIFE.

1988
APPROVAL IS GIVEN FOR COMMERCIAL CULTIVATION OF THE FIRST SOUTH AFRICAN GENETICALLY MODIFIED FOOD CROP. IT IS COTTON THAT HAS BEEN ENGINEERED TO RESIST ATTACK BY CATERpillARS.

1997
THE FIRST GENETICALLY MODIFIED ORGANISM (GMO) IS PASSED IN SOUTH AFRICA.

1997
SCOTTISH SCIENTISTS ANNOUNCE THE BIRTH OF A SHEEP NAMED DOLLY. SHE IS THE FIRST HIGHER MAMMAL TO BE CLONED FROM AN ADULT CELL. THIS CLONING WAS SUCCESSFUL AFTER 276 ATTEMPTS.

1997
APPROVAL IS GIVEN FOR COMMERCIAL CULTIVATION OF THE FIRST SOUTH AFRICAN GENETICALLY MODIFIED FOOD CROP. IT IS COTTON THAT HAS BEEN ENGINEERED TO RESIST ATTACK BY CATERpillARS.

1999
THE EUROPEAN UNION PUTS A MORATORIUM ON NEW COMMERCIAL APPROVALS FOR GENETICALLY MODIFIED FOOD CROPS.

2000
SCIENCE RICE IS GENETICALLY ENGINEERED TO CONTAIN HIGH LEVELS OF VITAMIN A TO HELP PREVENT BLINDNESS.

2001
THE SOUTH AFRICAN NATIONAL BIOTECHNOLOGY STRATEGY IS PUBLISHED.

2001
THE HUMAN GENOME PROJECT IS COMPLETED, REVEALING APPROXIMATELY 90,000 INDIVIDUAL GENES. SCIENTISTS GO ON TO DISPUTE THIS FINDING CLAIMING THAT THE NUMBER OF HUMAN GENES IS CLOSER TO 100,000.

2003
THE EUROPEAN UNION IMPLEMENTS NEW LEGISLATION ON APPROVAL OF COMMERCIALISATION OF GENETICALLY MODIFIED FOOD CROPS.

2003
THE CARTAGENA PROTOCOL IS IMPLEMENTED. IT IS AN INTERNATIONAL AGREEMENT GOVERNING THE MOVEMENT ACROSS BORDERS OF LIVING GENETICALLY MODIFIED ORGANISMS (GMOs), E.G. BEES.

2003
THE SOUTH AFRICAN DURIY COON IS THE FIRST HIGHER MAMMAL TO BE CLONED ON THE AFRICAN CONTINENT.

2003
THE CARTAGENA PROTOCOL IS IMPLEMENTED. IT IS AN INTERNATIONAL AGREEMENT GOVERNING THE MOVEMENT ACROSS BORDERS OF LIVING GENETICALLY MODIFIED ORGANISMS (GMOs), E.G. BEES.

15TH ANNIVERSARY CARTAGENA PROTOCOL ON BIOSAFETY



OUR COUNTRY IS PART OF AN INTERNATIONAL AGREEMENT: THE CARTAGENA PROTOCOL ON BIOSAFETY ENSURING THE SAFE HANDLING, TRANSFER AND USE OF LIVING MODIFIED ORGANISMS (LMOs) KNOWN AS GENETICALLY MODIFIED ORGANISMS (GMOs)



PUBLIC PARTICIPATION IS A REQUIREMENT



A PUBLIC CONSENT BEFORE IMPORTING LMOs/GMOs IS NEEDED



STRICT RISK ASSESSMENTS AND RISK MANAGEMENT OF GMOs/LMOs ARE DONE AT EVERY STAGE OF GMO IMPORTS TO EVALUATE AND MONITOR BEFORE AND AFTER THESE PRODUCTS ARE AVAILABLE



GMOs HAVE BEEN USED COMMERCIALY SINCE 1990s
SIGNIFICANT INFORMATION, EXPERIENCE AND EXPERTISE OF THE REGULATION OF GMOs ENSURES SUSTAINABLE DEVELOPMENT

Case study Public perceptions of Biotechnology in South Africa

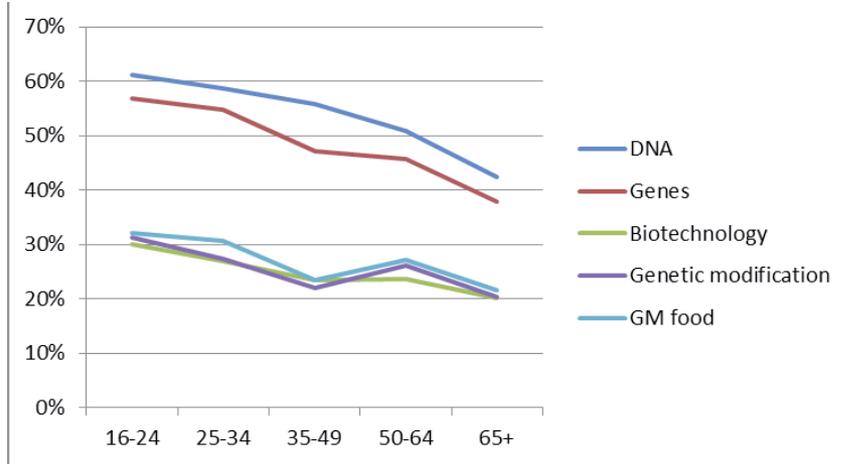
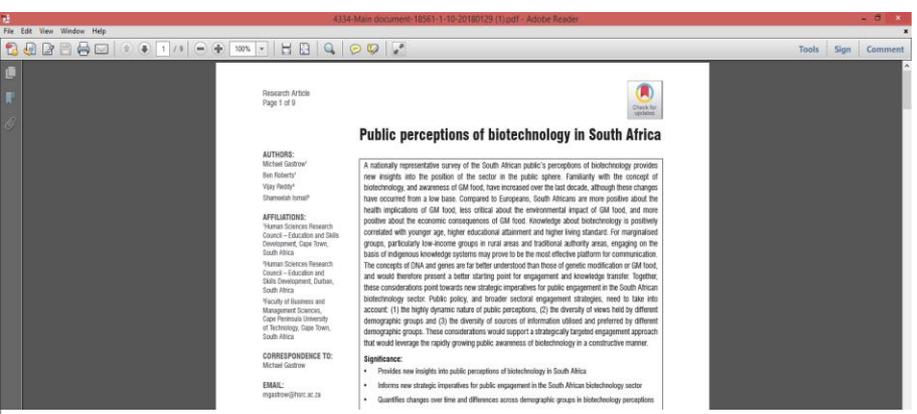


Figure 2, Knowledge of core biotechnology concepts, by age group.

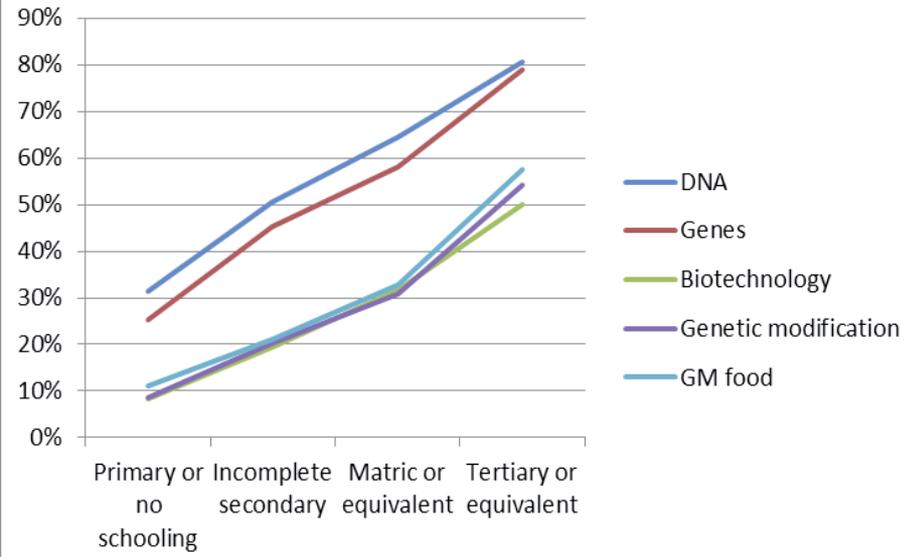


Figure 1, Knowledge of core biotechnology concepts, by education level.

Table 8: Sources of information on biotechnology (% respondents)

If you wanted to learn more about biotechnology, how likely would you be to get your information from the following sources?	Very likely	Somewhat likely	Not very likely	Not likely at all	Don't know
TV	51	21	12	12	4
Radio	35	25	17	18	5
Print media (books, newspapers and magazines)	27	29	19	20	5
Internet	34	20	12	29	5
School or college	26	20	15	34	5
Science centre	29	16	14	36	6
Friends or family	23	23	19	30	5

Source: South African Social Attitudes Survey 2015



Thank You

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environmental affairs

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