



Country Report-Pakistan

Recent Developments In Cotton

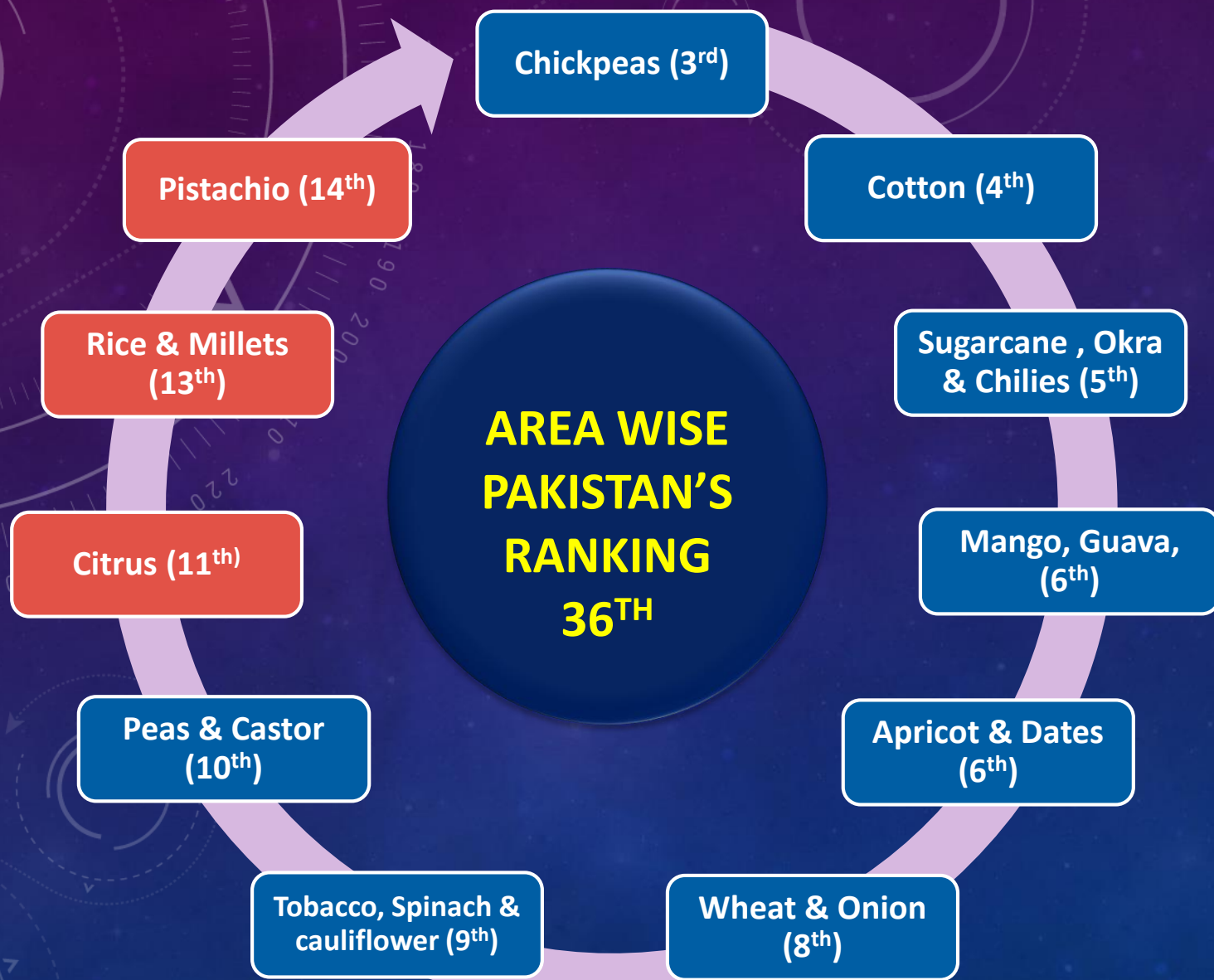


Dr. Muhammad Kashif Riaz Khan

Principal Scientist

**Nuclear Institute for Agriculture & Biology
(NIAB), PAKISTAN**

Pakistan ranking in the World (Production)



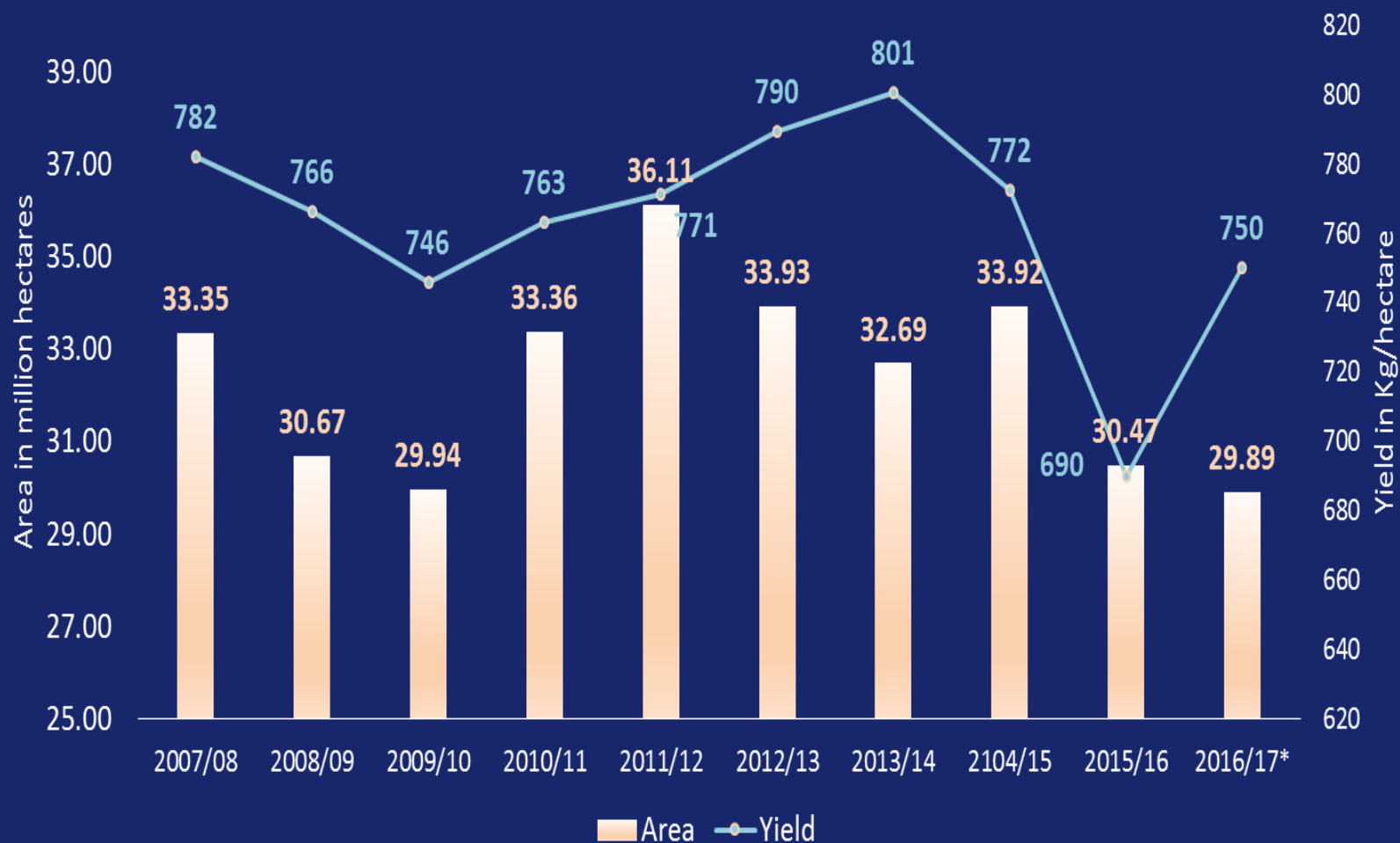


Quick Facts about cotton

- ❖ 1.5% to GDP and 6.7% to total value addition in agriculture.
- ❖ 4th largest cotton producer in the world after India, China and the USA.
- ❖ 7.1% share in the world cotton production during 2015-16.
- ❖ 2nd largest yarn exporter while 3rd largest consumer, yarn producer and cloth exporter in the world.

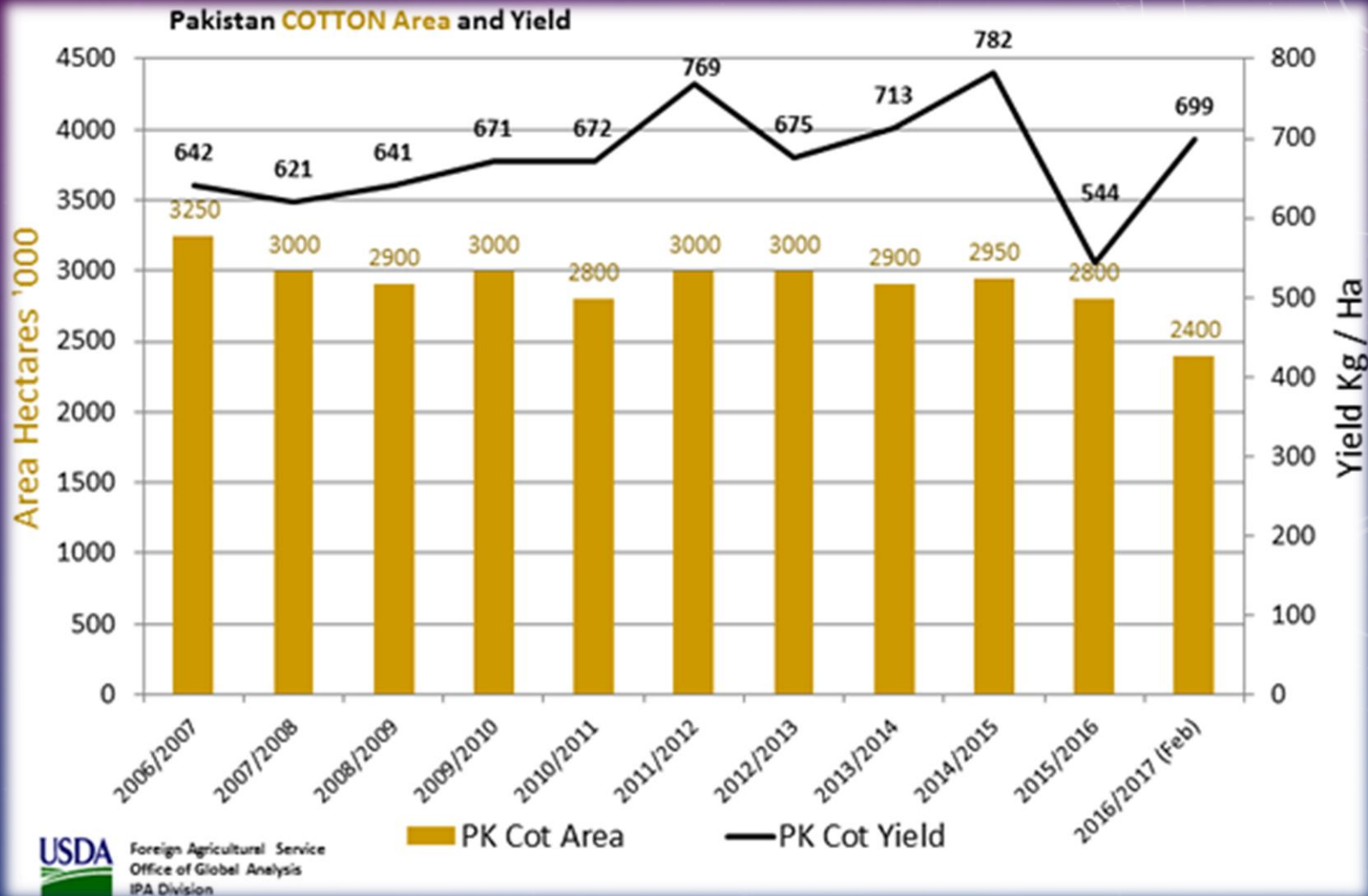


World Area & Yield

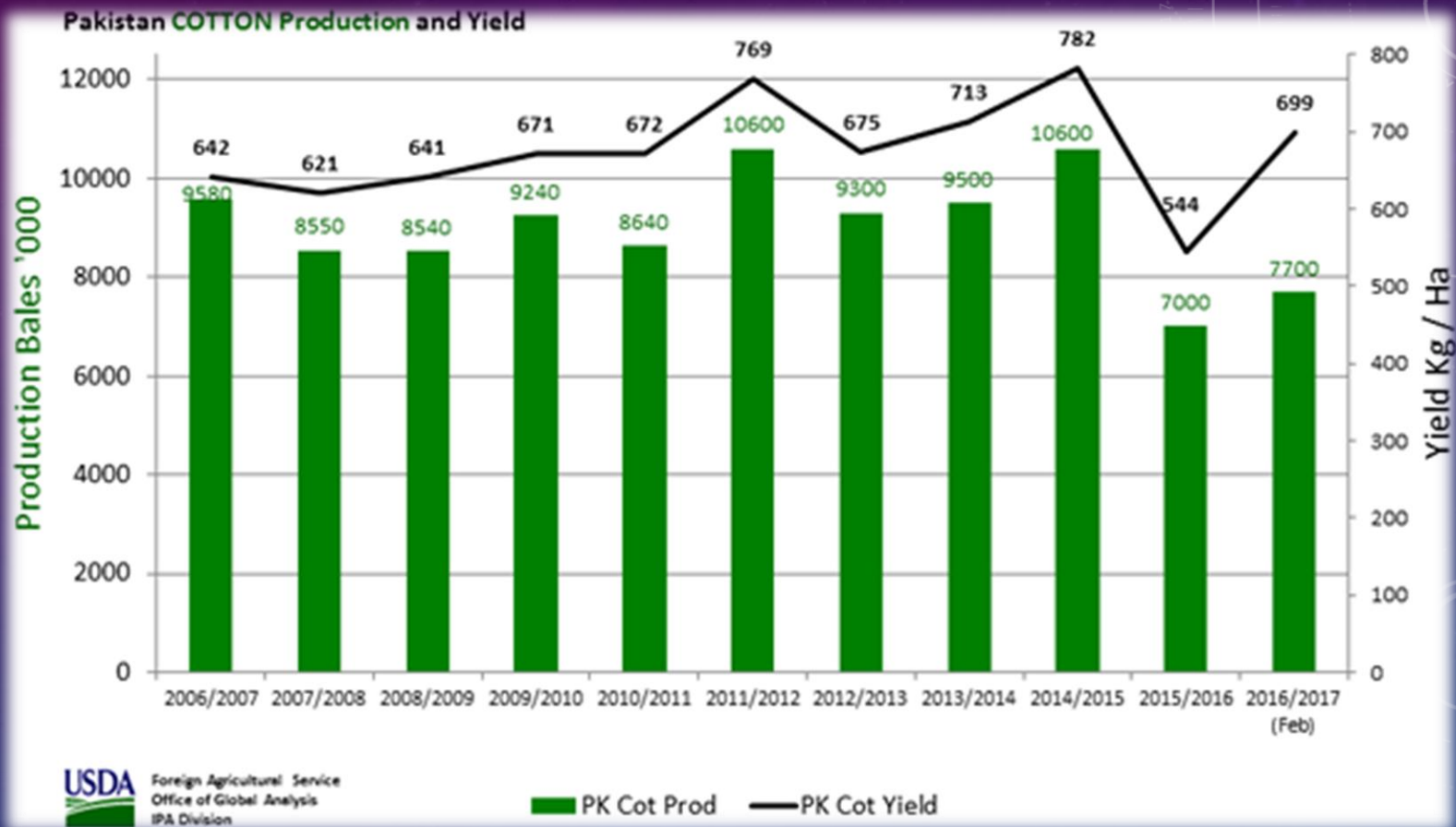


Source: ICAC

Pakistan Area & Yield

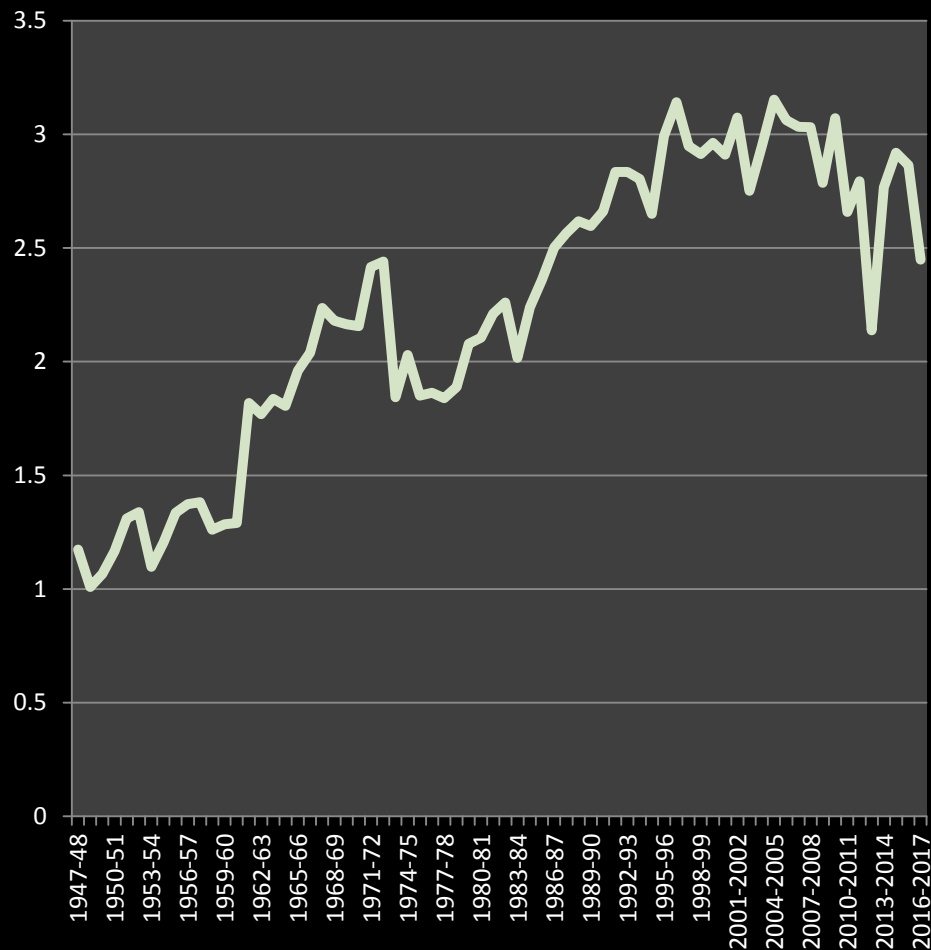


Pakistan Production & Yield

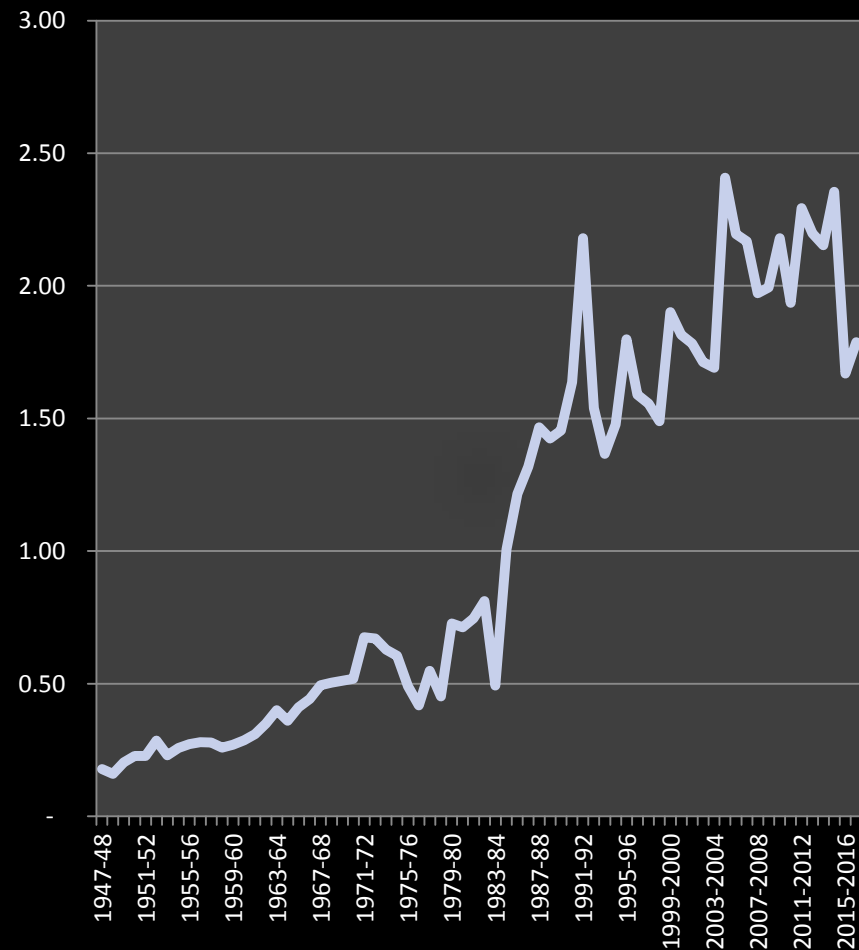




Area (million hectares)

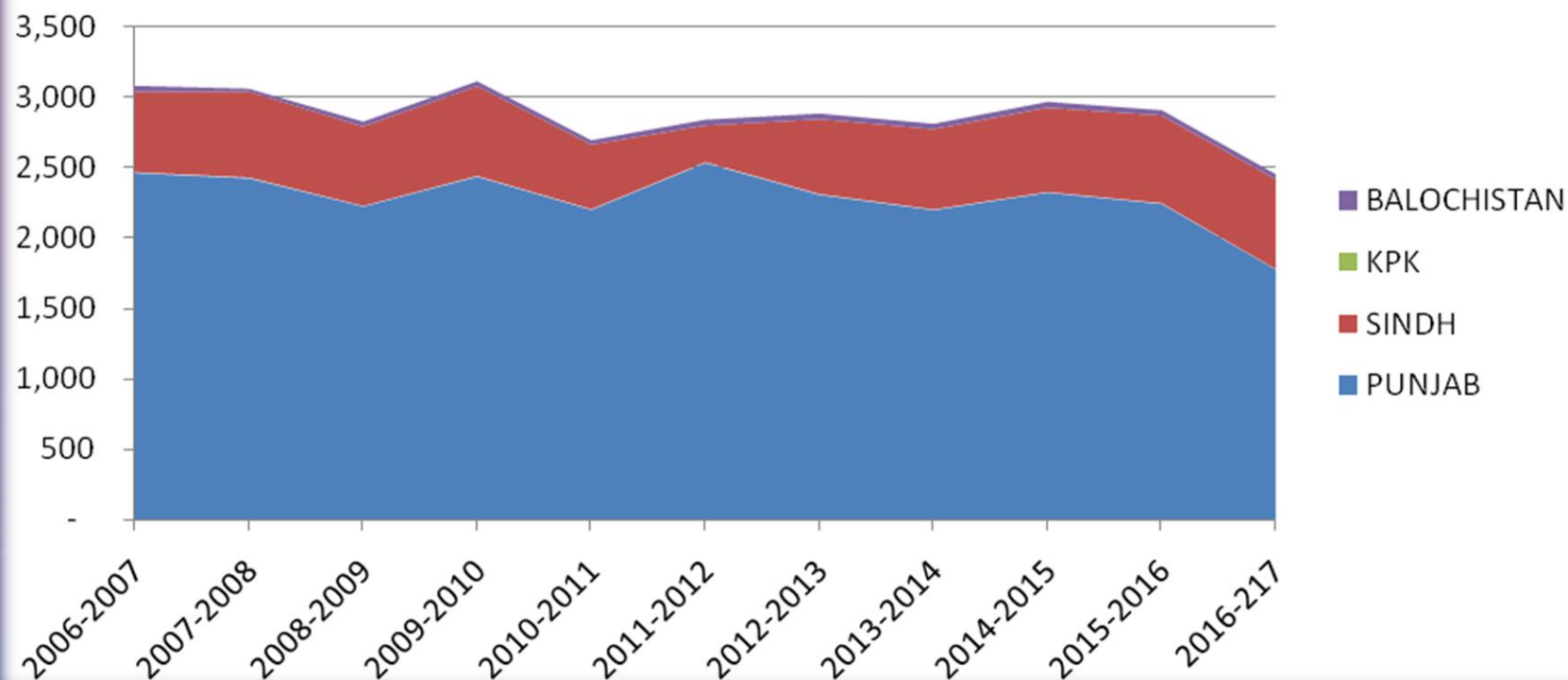


Production (million metric tons)



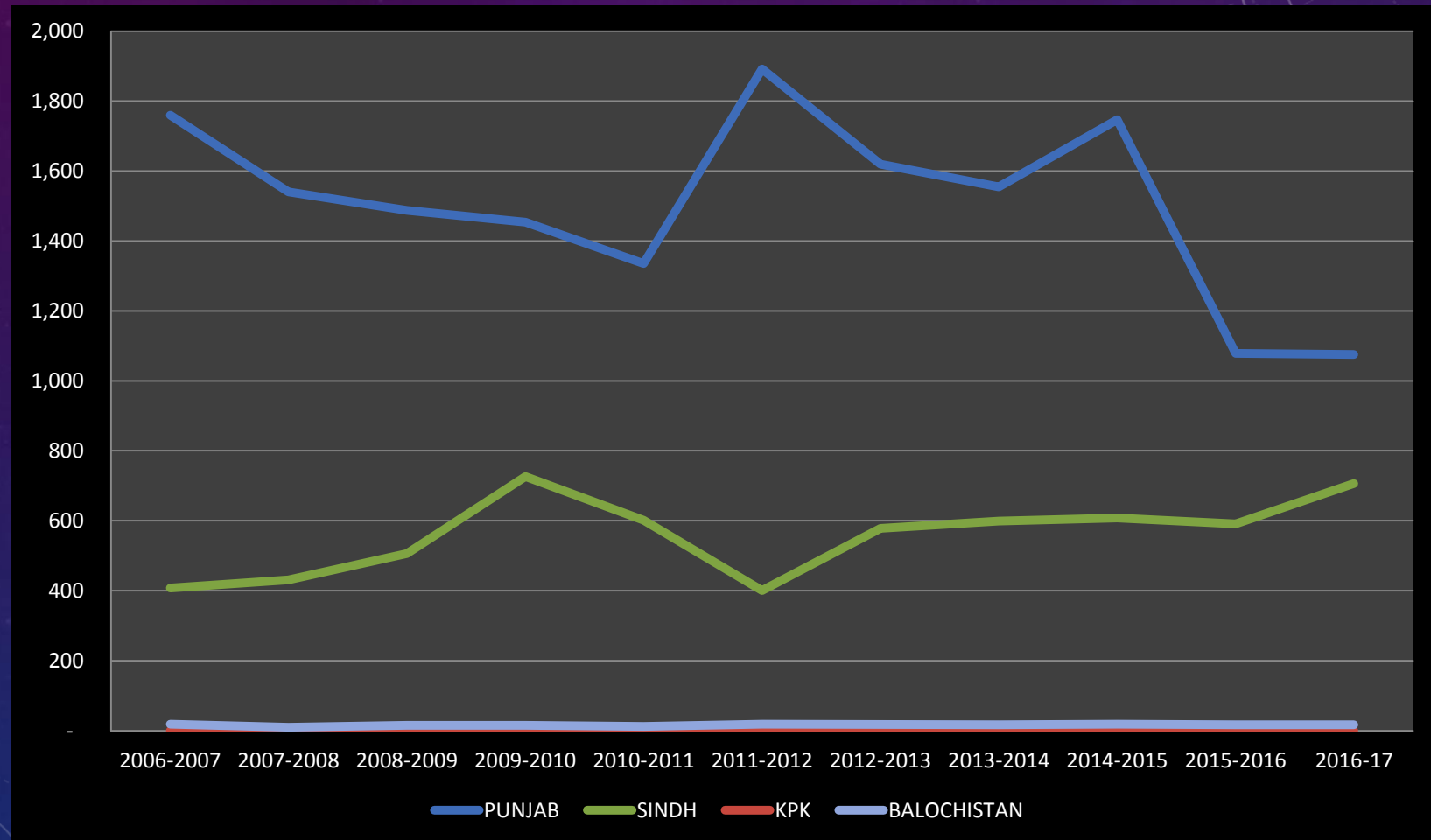


Province - Wise Area ('000' ha) 2006-17



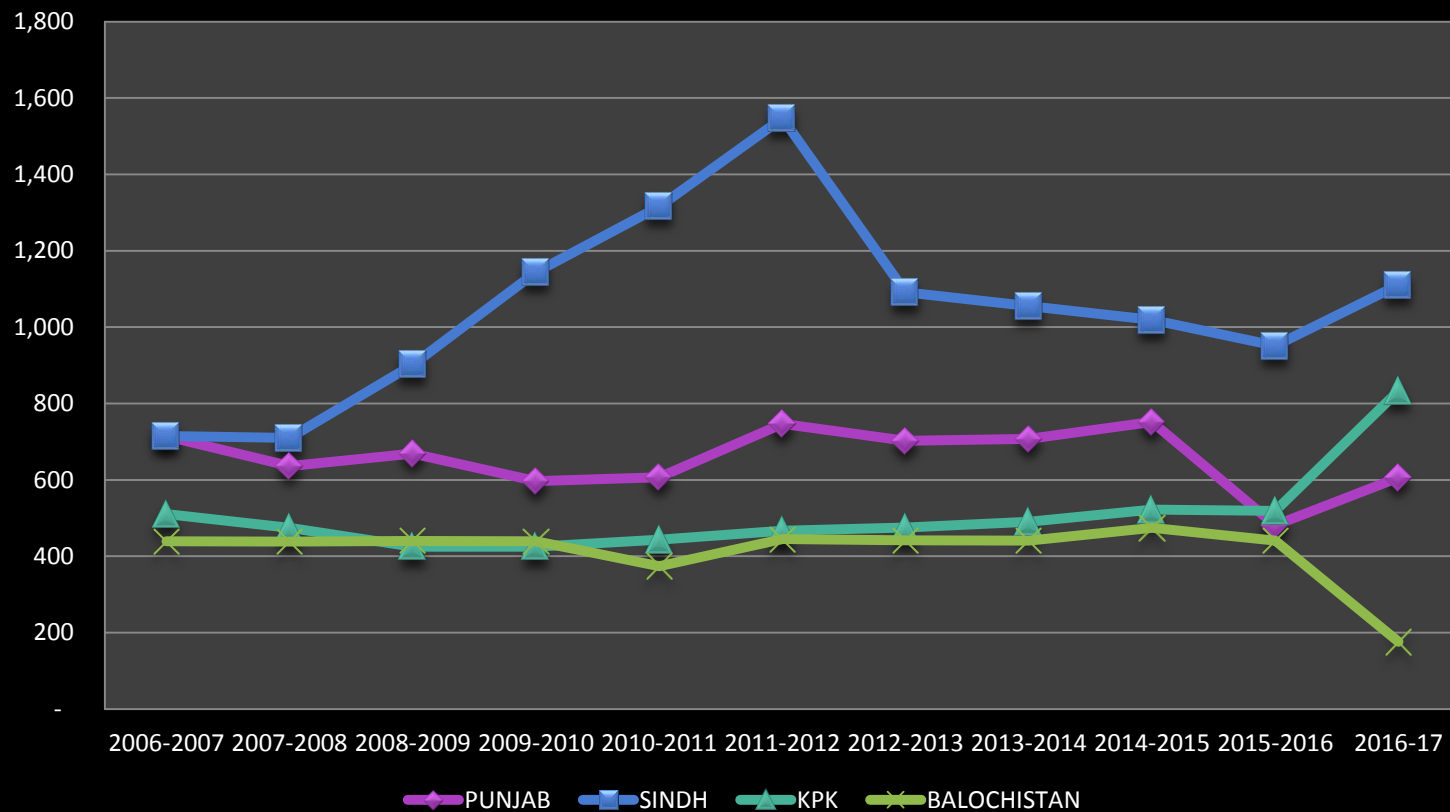


Province - Wise Production (Metric Tons) 2006-17





Province - Wise Yield (kg/ha) 2006-17





Cotton Research Setup in Pakistan

Main organizations are:

- Pakistan Central Cotton Committee (PCCC).
- Centre of Excellence in Molecular Biology (CEMB) Punjab University Lahore.
- National Institute of Biotechnology & Genetic Engineering (NIBGE) Faisalabad.
- Nuclear Institute of Agriculture & Biology (NIAB), Faisalabad.
- Ayub Agricultural Research Institute, Faisalabad.
- Agricultural University Peshawar.



Cotton Research Setup in Pakistan

- Nuclear Institute of Agriculture (NIA) Tando Jam, Sindh.
- Department of Agriculture Research, Sindh.
- Sindh Agriculture University Tando Jam.
- Mohammad Nawaz Shareef University of Agriculture, Multan.
- Pakistan Agricultural Research Council (PARC), Islamabad.
- Agriculture Policy Institute, Islamabad.
- Multinational & Private Sector Organizations.

06 Public sector Agriculture Universities

08 Agriculture Colleges

National Textile University and other engineering universities



Cotton Breeding Program in Pakistan

- **Seed cotton yield and fiber Quality**

The cotton breeding program in Pakistan especially at NIAB focuses to develop improved varieties with no compromise on fiber quality.

- Fiber length : >28mm
- Lint percentage : >37.5
- Fineness : 3.8 - 4.9 ug/inch.
- Fiber strength : 92 and above (tppsi).
- Uniformity ratio : not<48%.
- Fiber maturity : 80%.



Cotton Breeding Program in Pakistan

- **Drought tolerance**

- Irregular rains and climate change, water reservoirs
- Demand for drought tolerant varieties-wild *Gossypium* species

- **Heat tolerance**

- Temperatures (over 45°C).
- High temperatures----flower and fruit shedding results reflect in severe yield losses.

- **Insects and Diseases resistance**

- Cotton Leaf Curl Virus (Burewala strain of cotton virus)
- Pink Bollworm
- Wild species, mutation breeding



Cotton Breeding Program in Pakistan

Testing and approval of a variety

- The homozygous selected material (strains) is tested in micro Varietal and Provincial Coordinated Cotton Trial (PCCT), and then passed through National Coordinated Varietal Trial (NCVT) for the approval as a variety.



Genetic Stock Situation

Name	Quantity
Local genotypes	1064
Exotic genotypes	4701
Total	5765
Species –Wise Detail	
<i>Gossypium herbaceum</i> L	556
<i>Gossypium arboreum</i> L	1025
<i>Gossypium hirsutum</i> L	4077
<i>Gossypium barbadence</i> L	5765



Cotton Market Structure in Pakistan



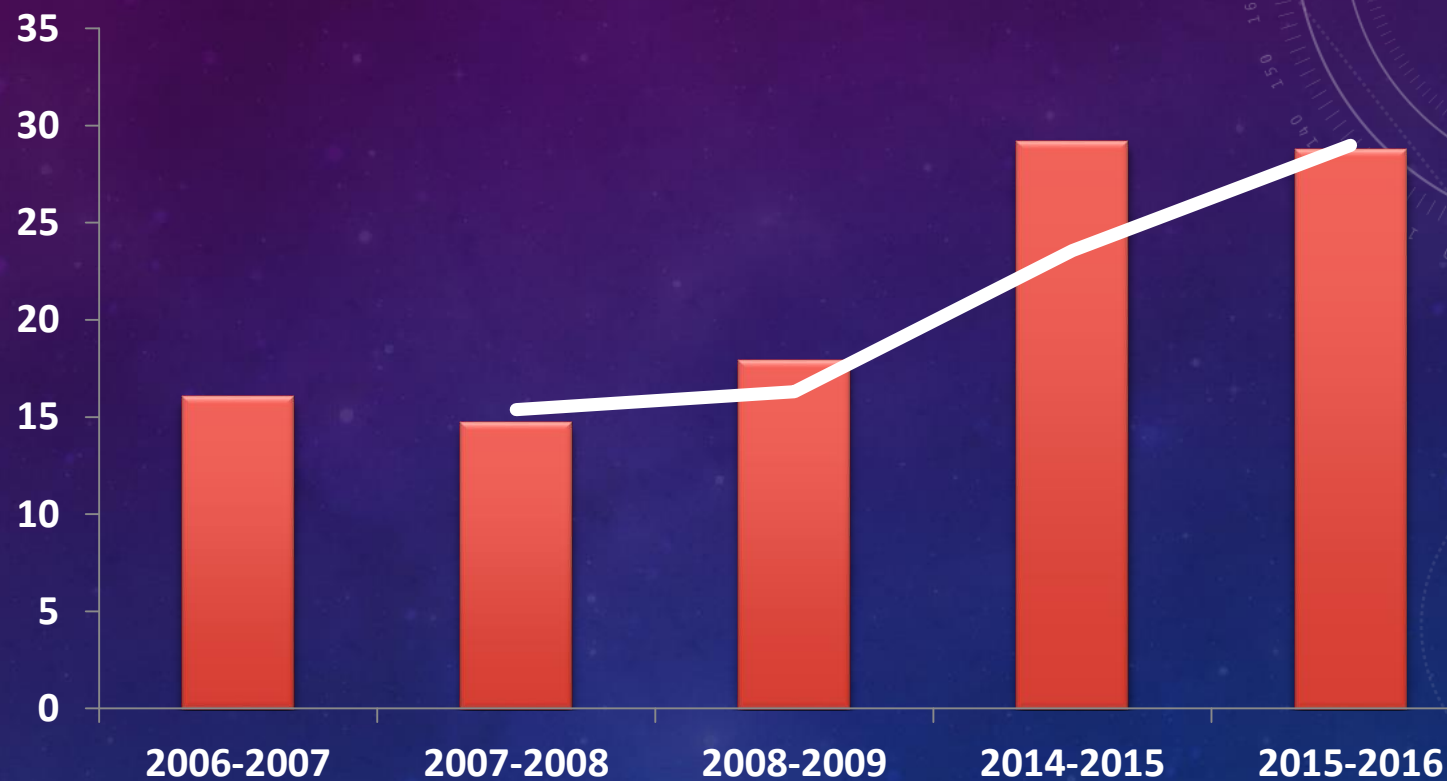


Farm Level Cost of Production (US\$ per 40 kg)



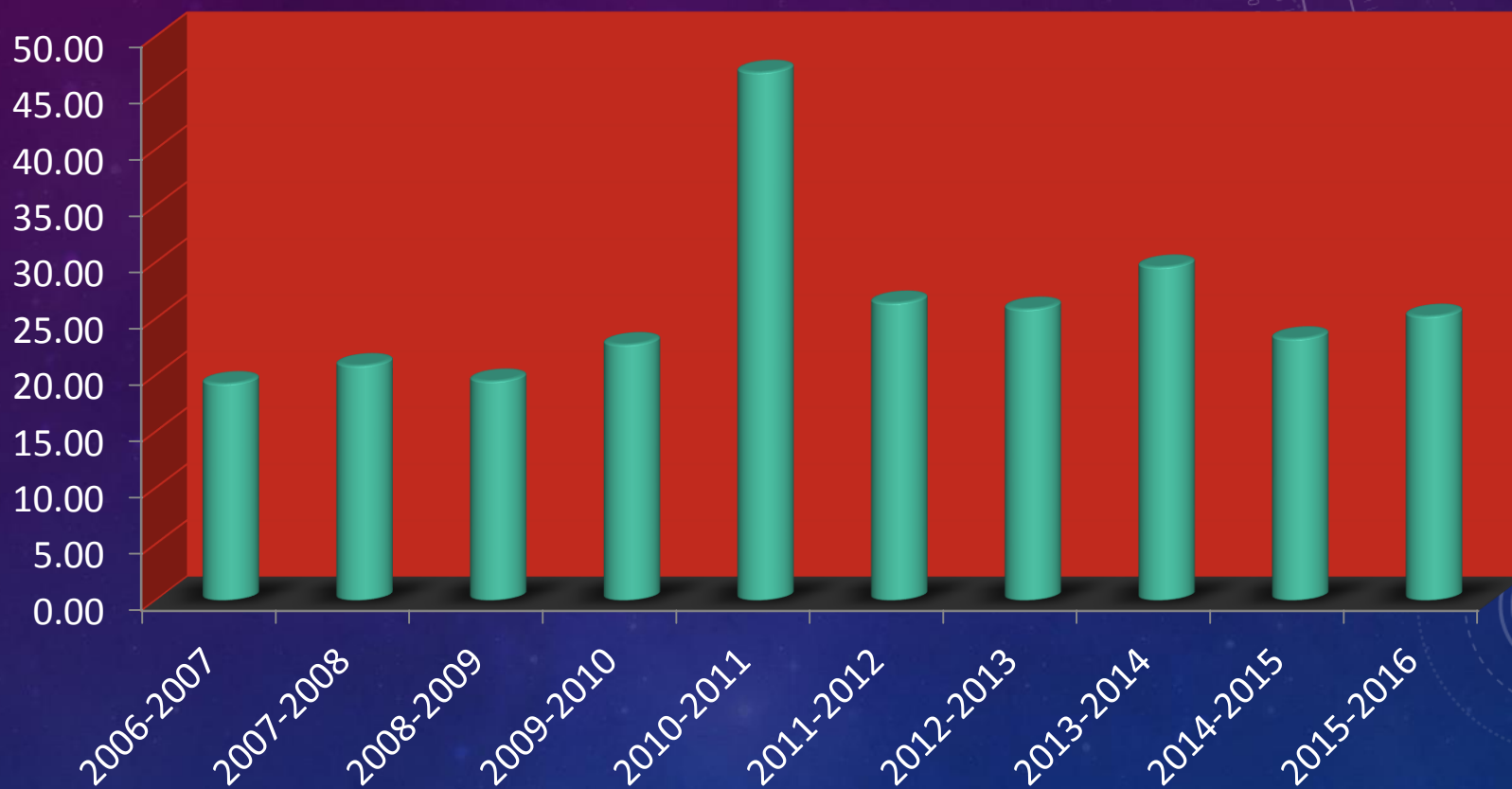


Seed Cotton Intervention Prices (US\$ per 40 kg)



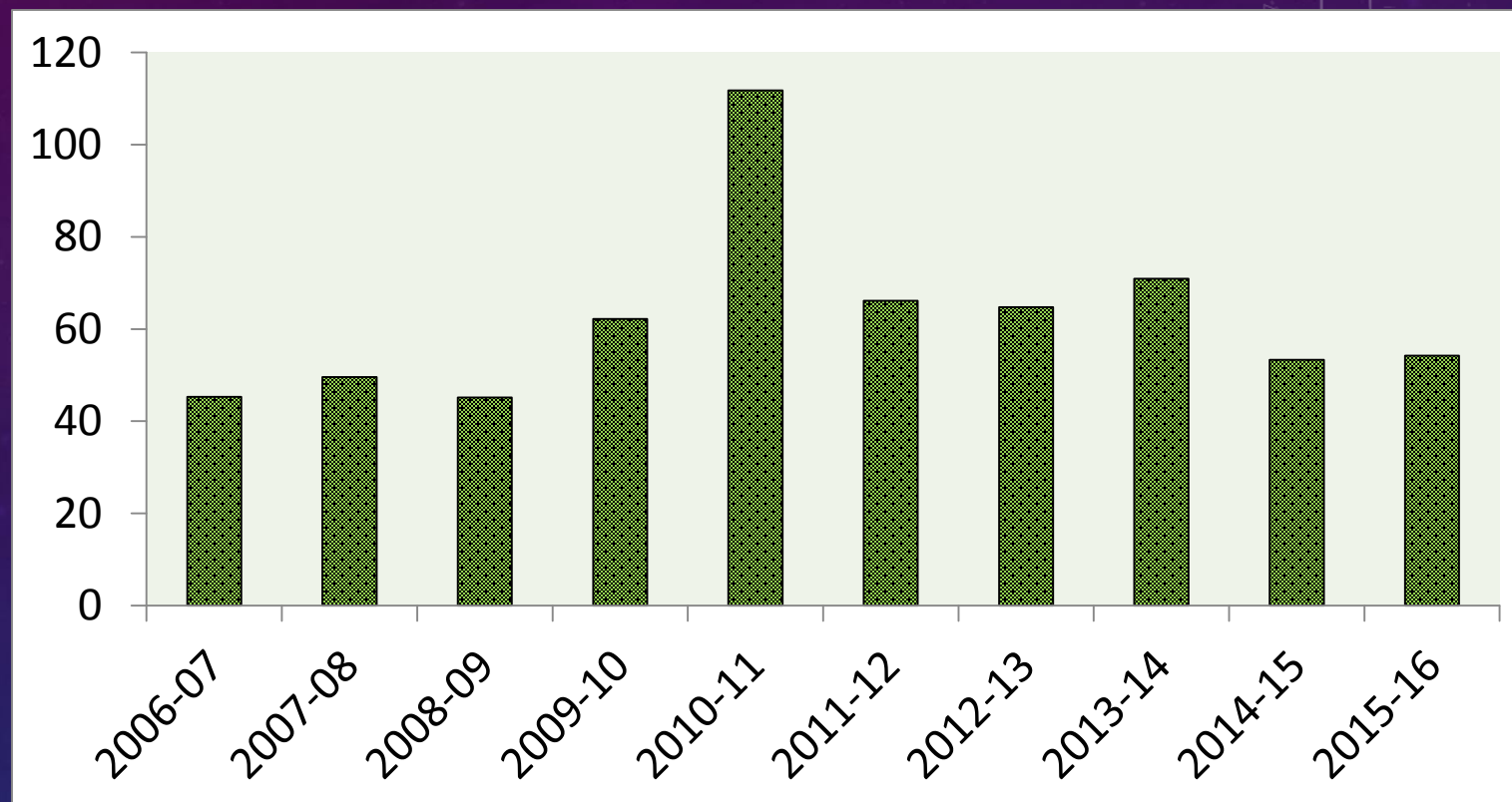


Seed Cotton Prices (US\$ per 40 kg)



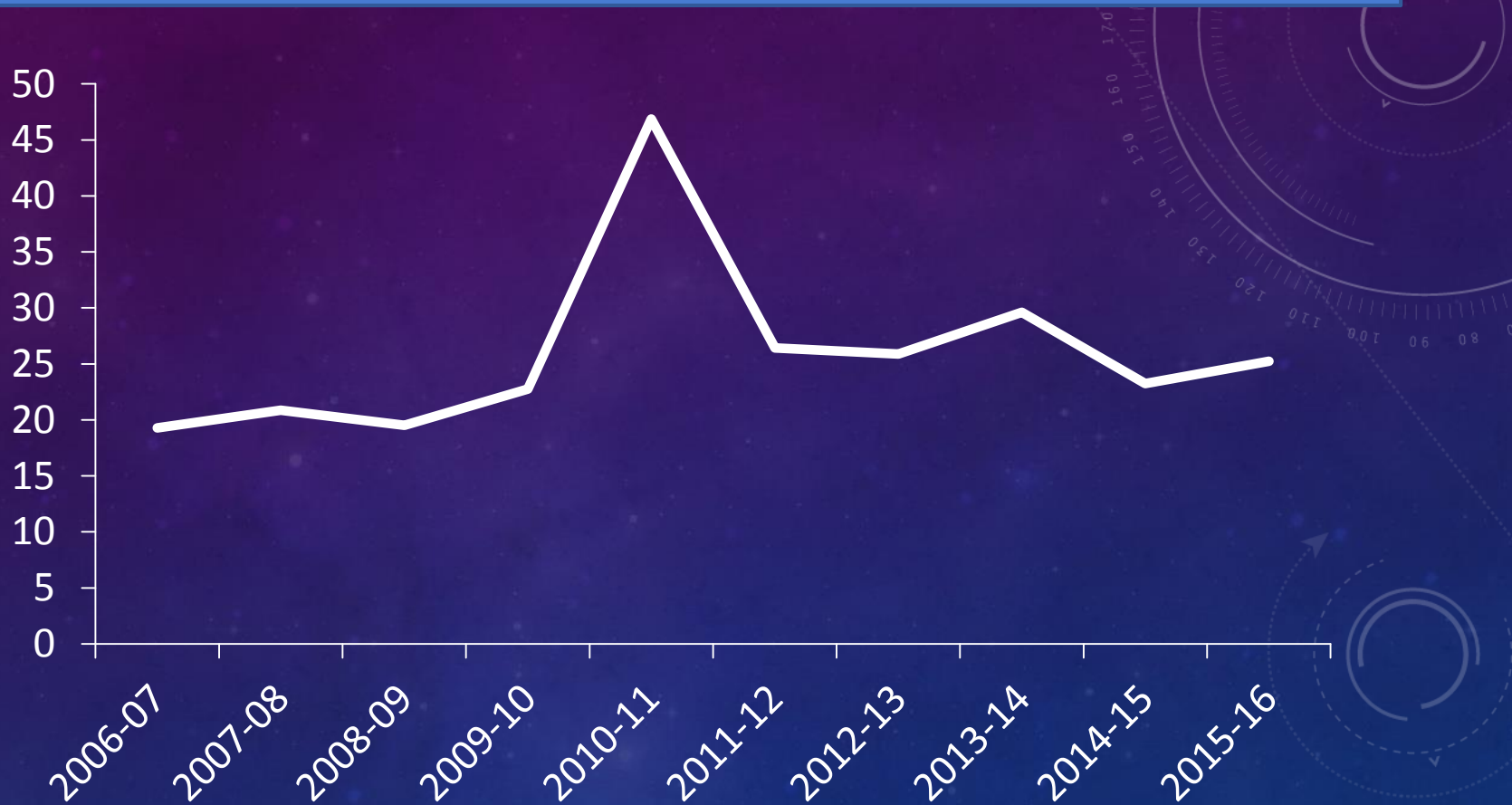


Raw Cotton Prices (US\$ per 40 kg)





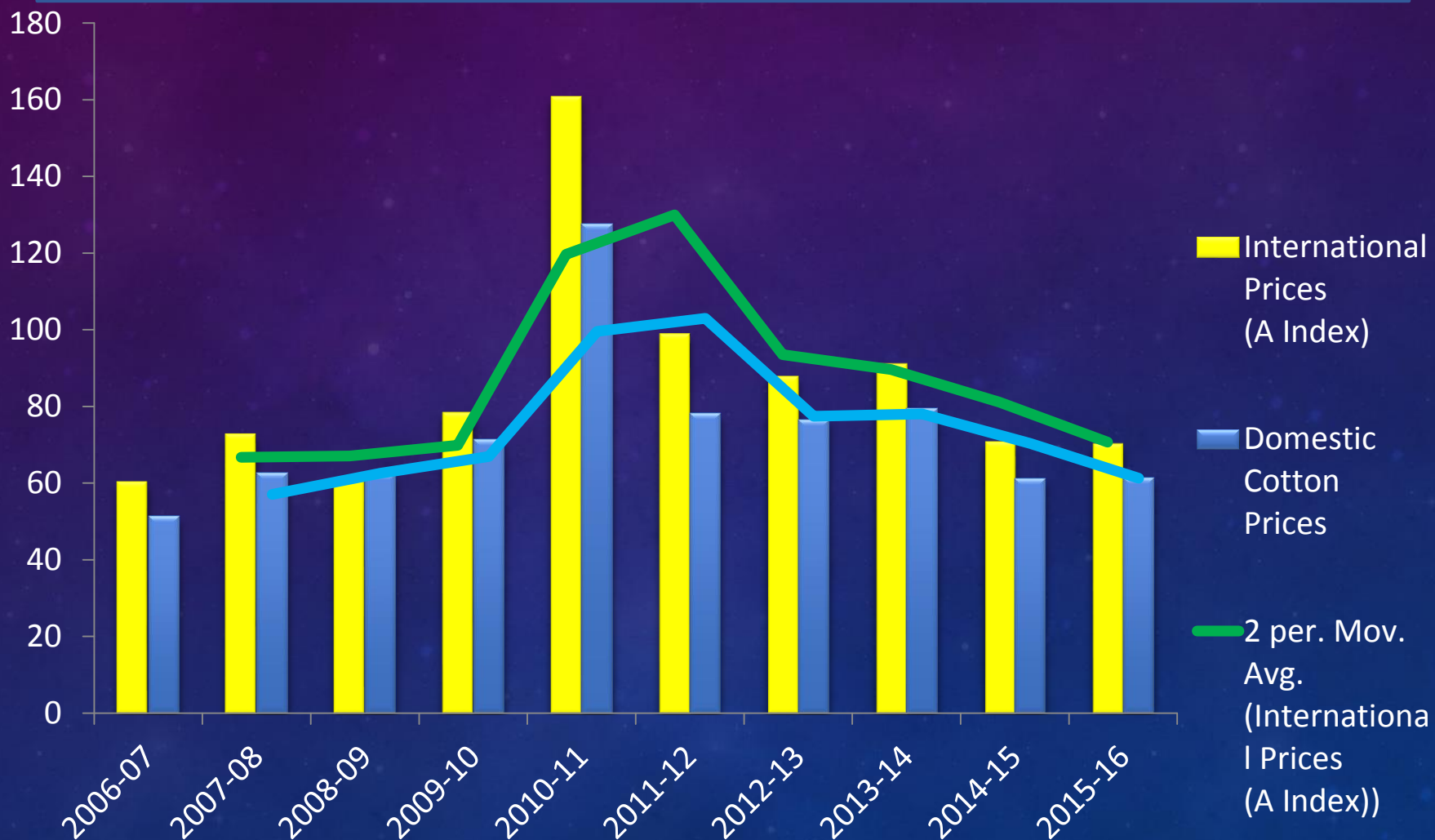
Seed Cotton Prices (US\$ per 40 kg)





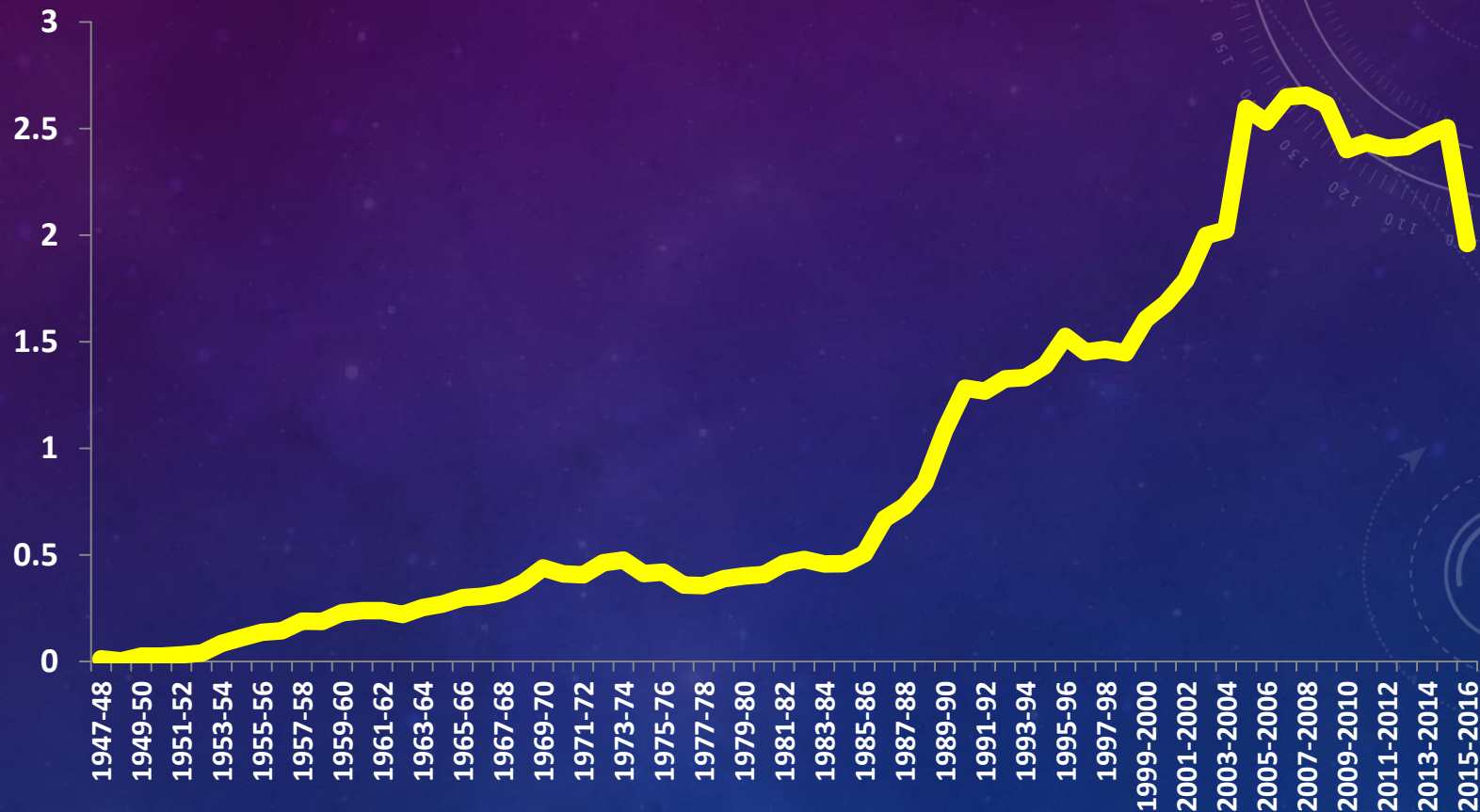
Domestic & International Cotton Prices

(US cents per pound)





Changes In Mill Consumption (million metric tons)



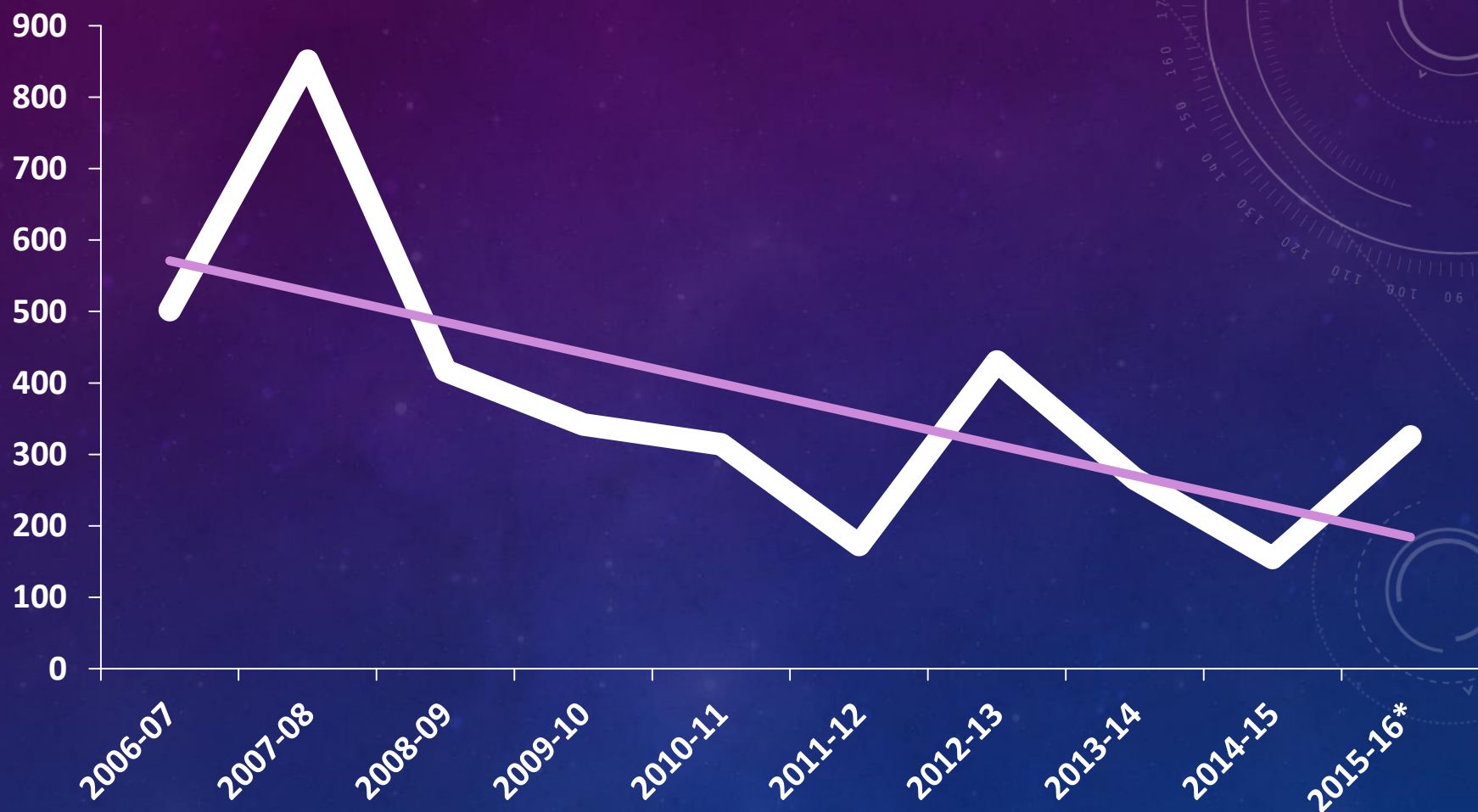


Exports of Raw Cotton ('000' metric tons)



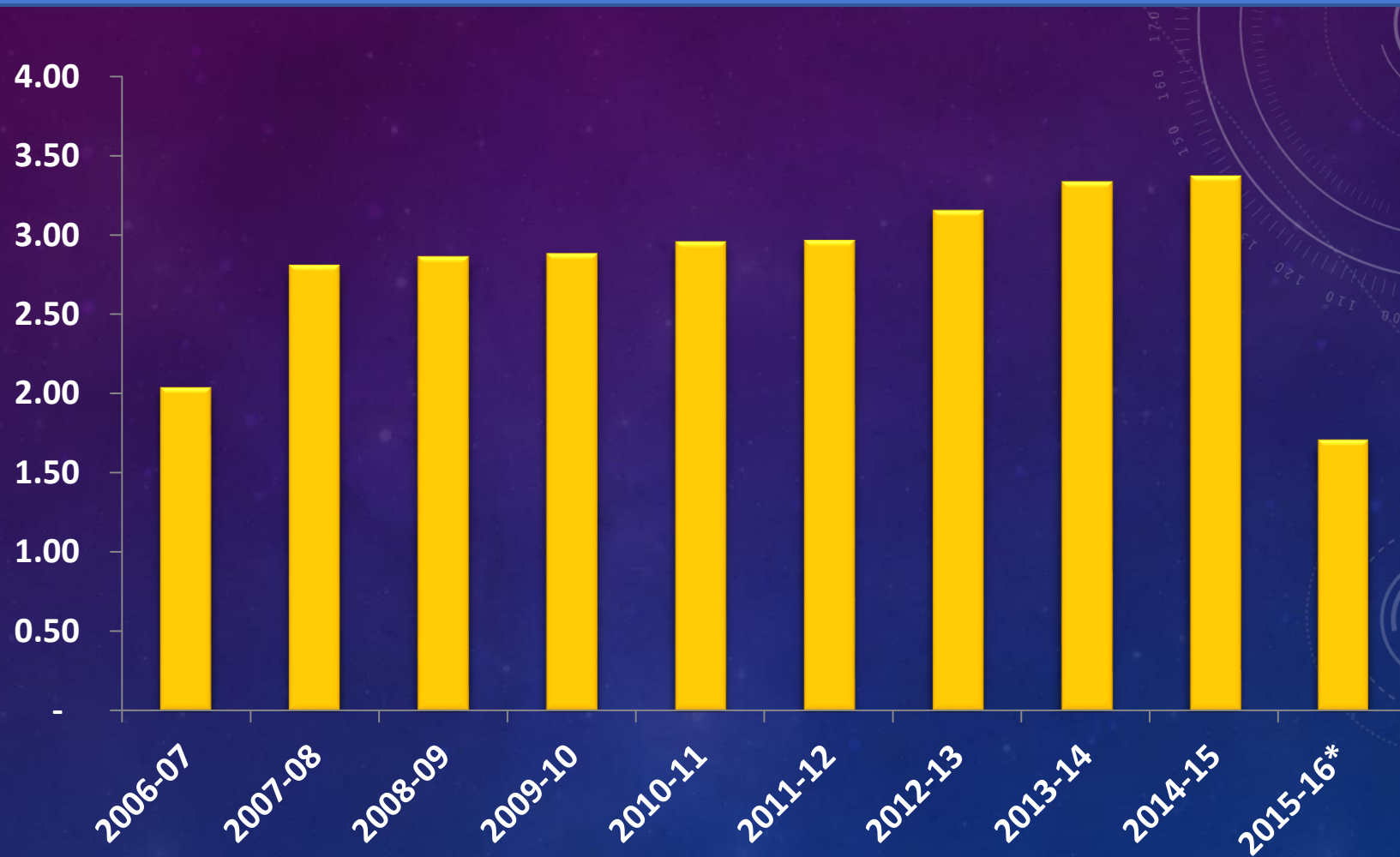


Imports Of Raw Cotton ('000' metric tons)



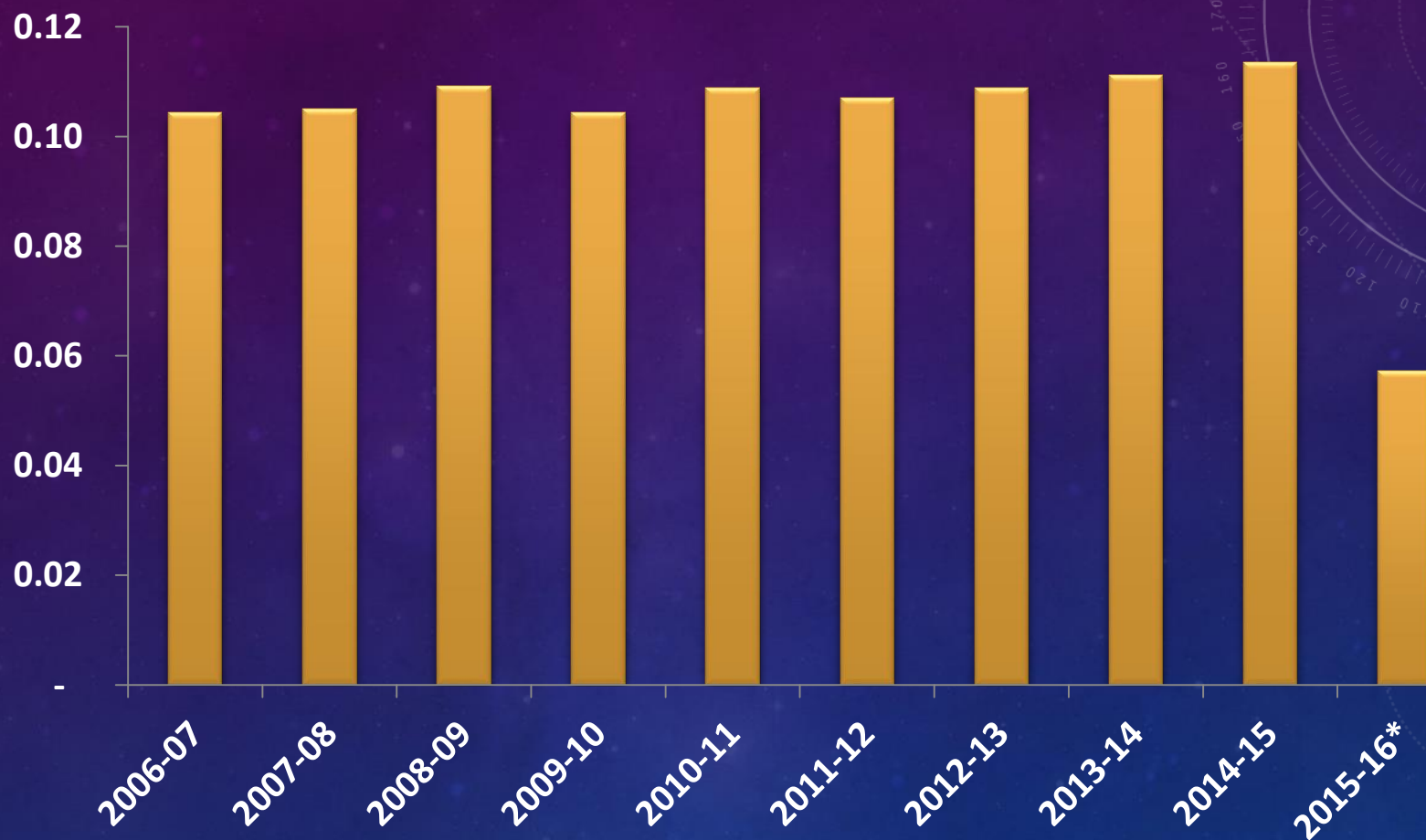


Yarn Production (million metric tons)



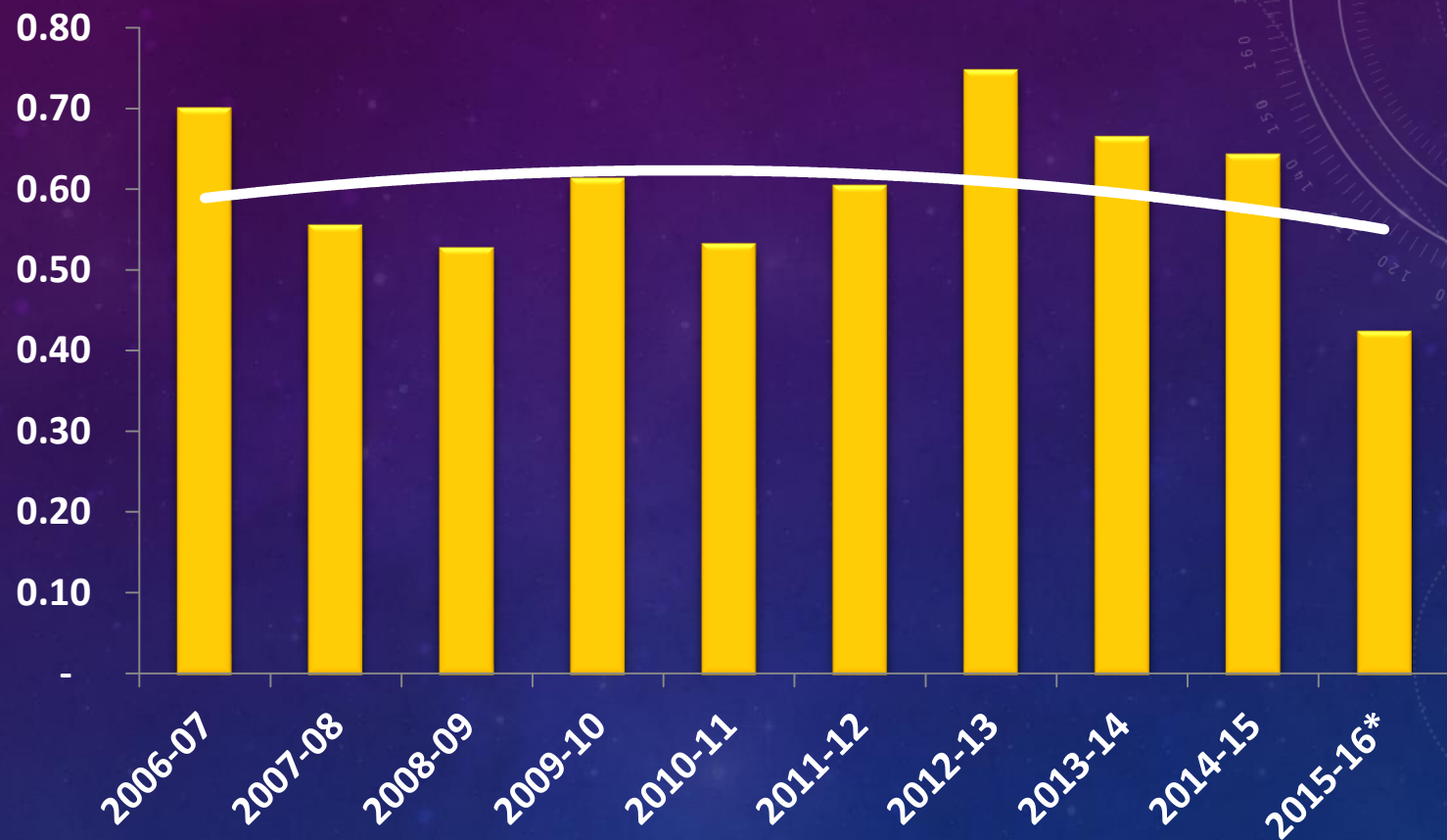


Yarn Consumption (million metric ton)



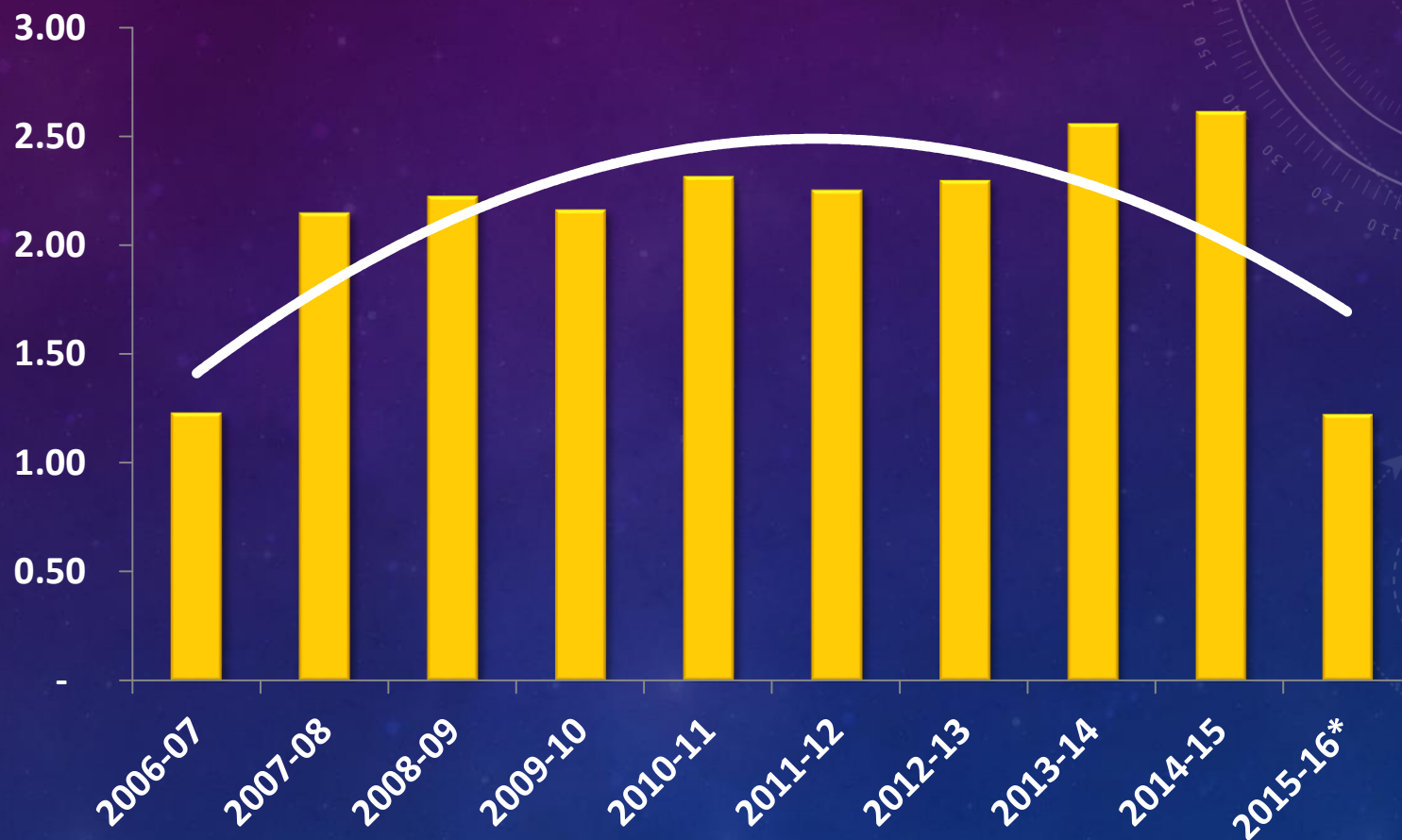


Yarn Exports (million metric ton)



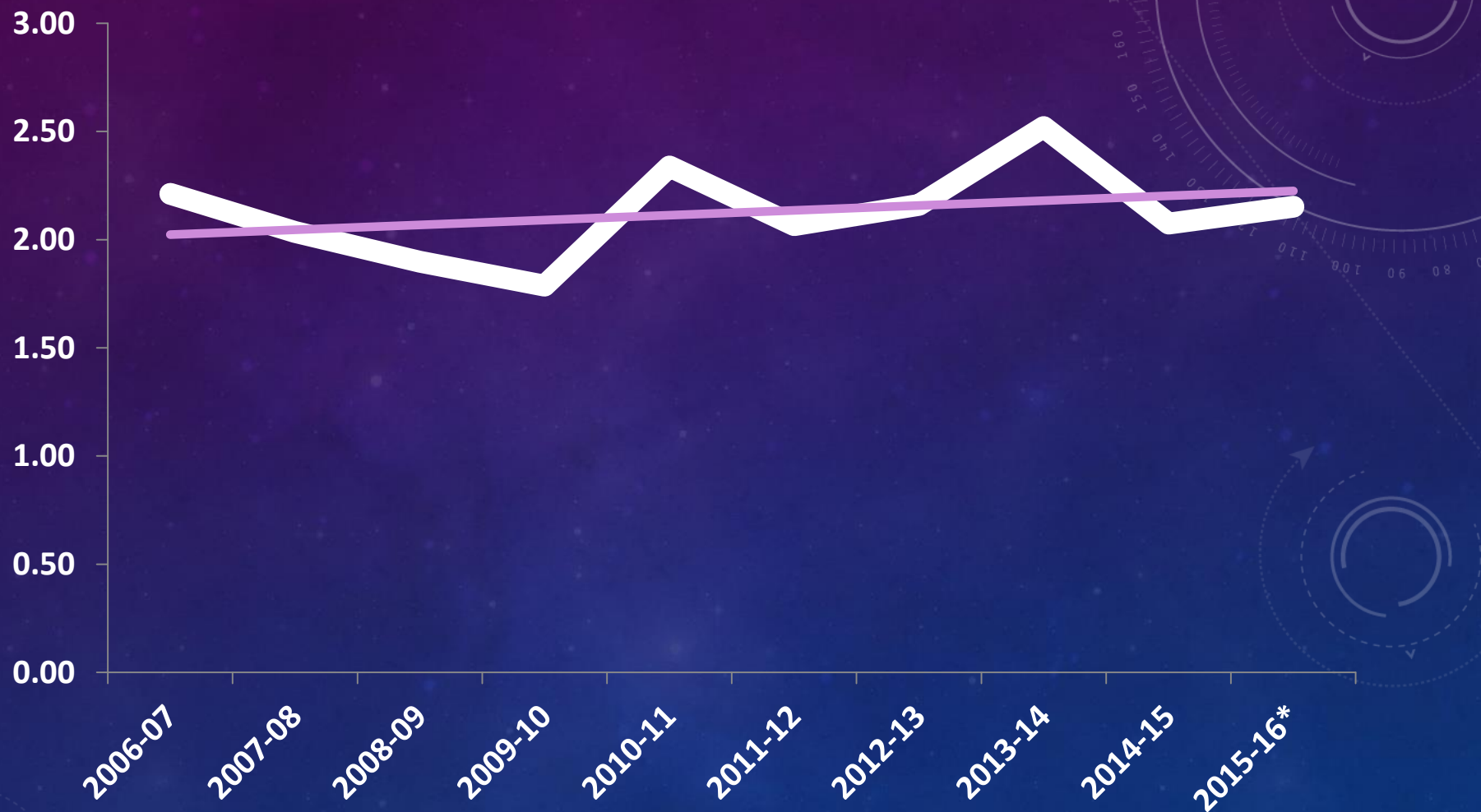


Yarn Available for Local Market (million metric ton)



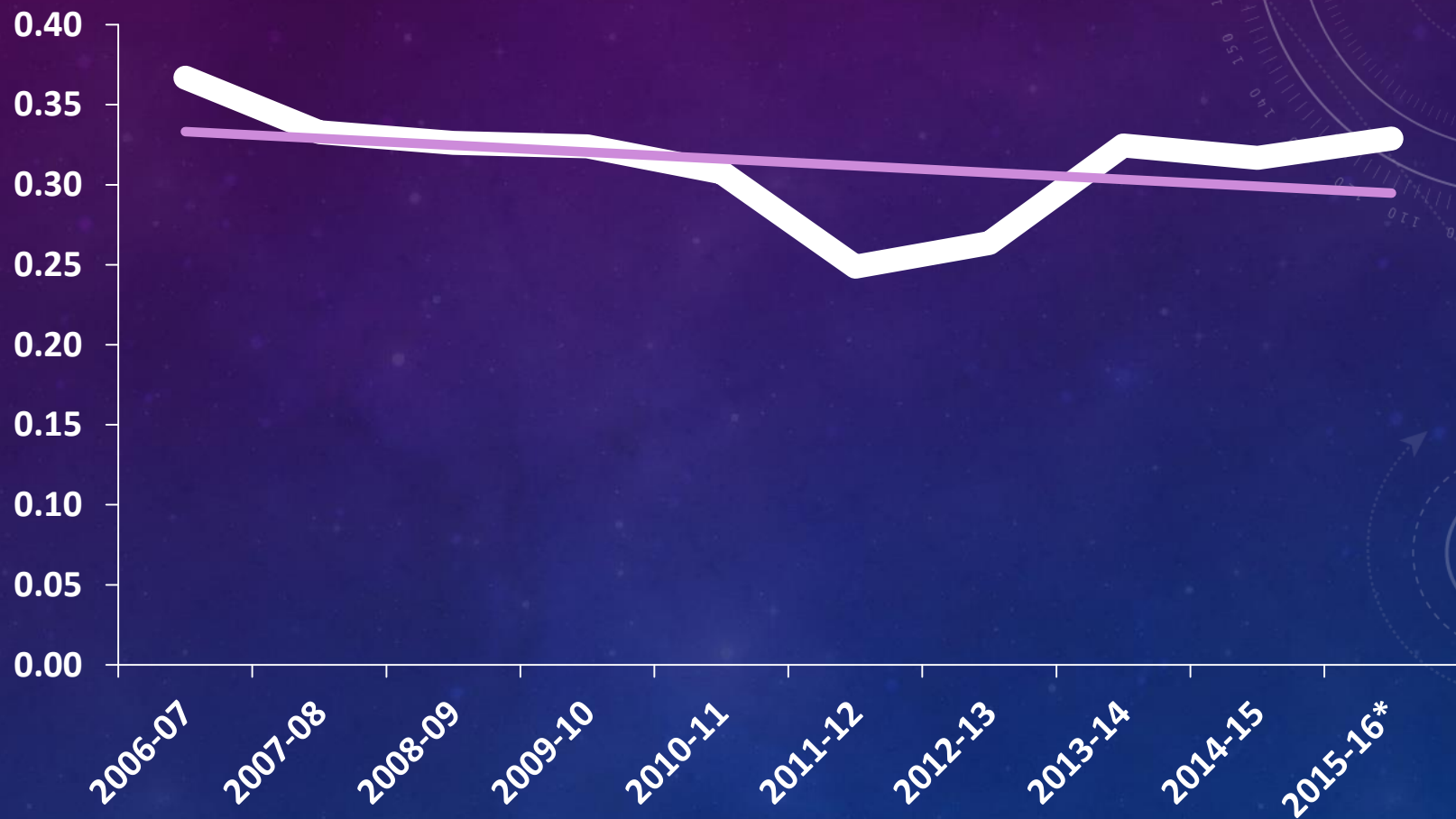


Exports of Cotton Cloth (million square meters)



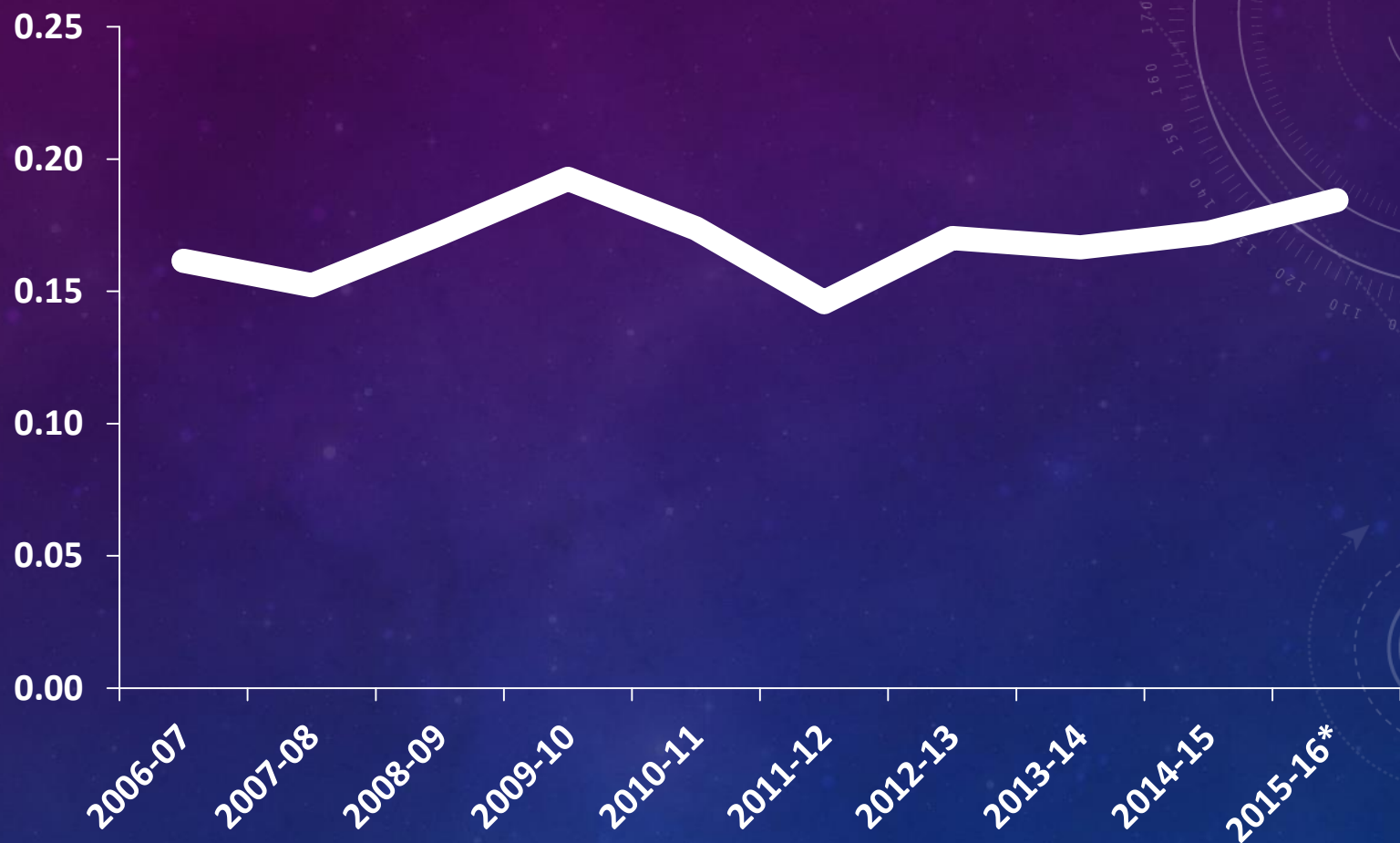


Exports of Cotton Bed Sheets (million metric ton)



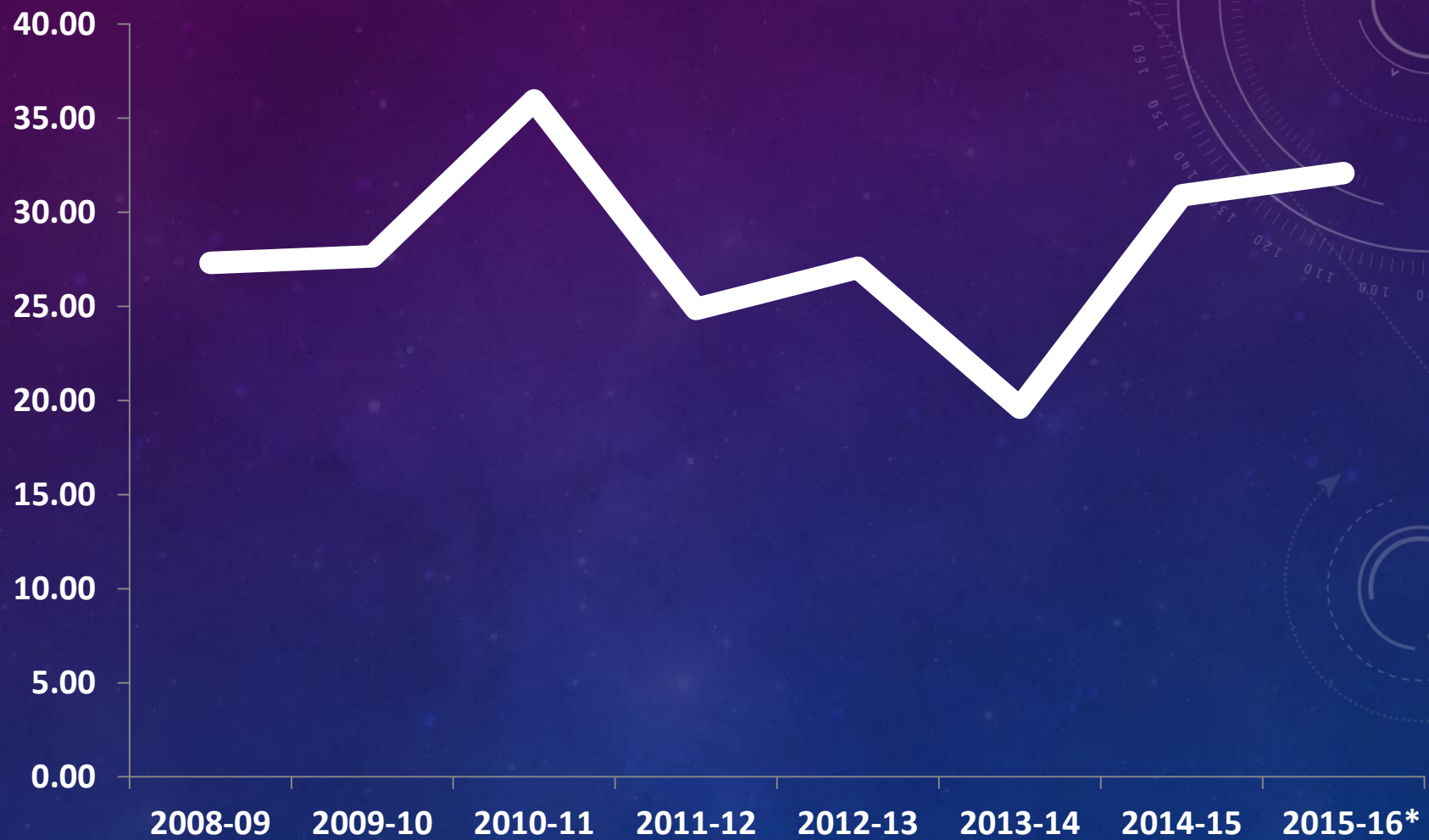


Exports of Cotton Towels (million metric ton)



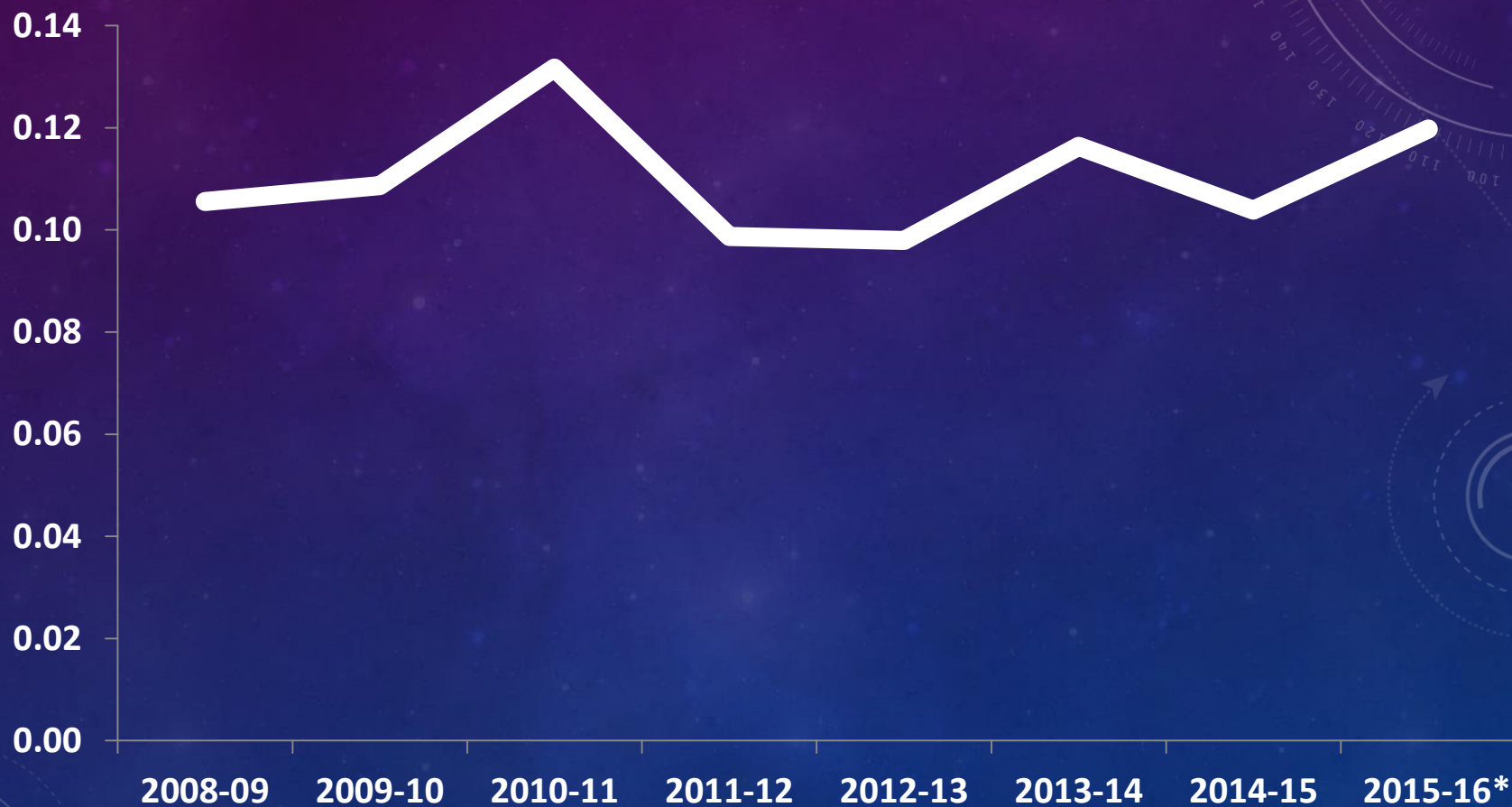


Exports of Ready Made Garments (000 dz)



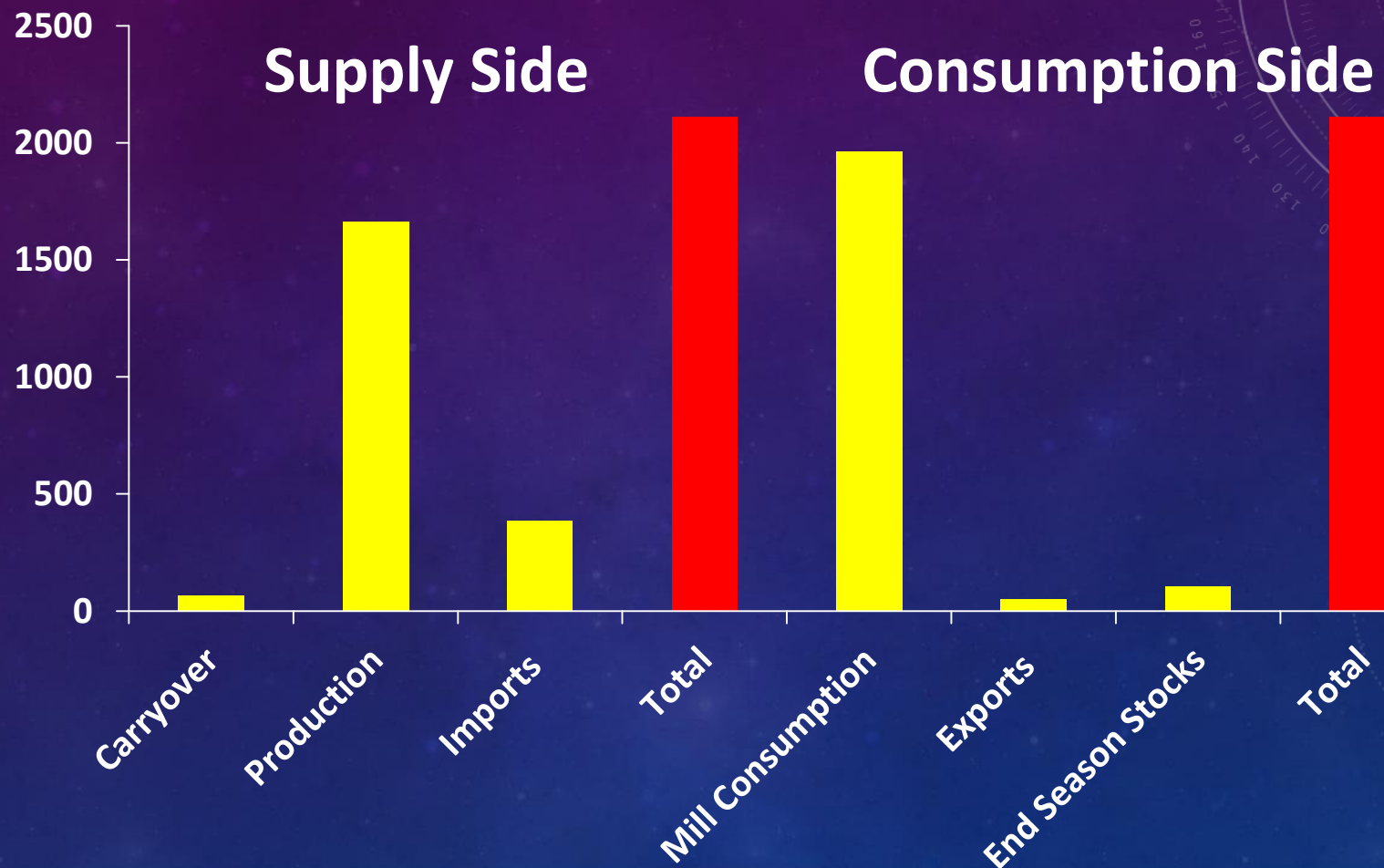


Exports of Cotton Knit Wear/Hosiery (000 dz)





Cotton Balance Sheet (2015-16)





Future Cotton Policy

- Germplasm improvements
- Hybrid cotton
- Farm and crop management
- Additional area under cultivation
- Organic cotton
- Climate resilient and Stress resistant varieties
- Necessary legislative and regulatory frameworks
(Plant Breeder's Act and Seed Act)
- Mechanical picking
- Public-Private partnership for introducing latest and effective insect protection technology



Economic impact of varieties evolved by NIAB, Faisalabad

Sr. No.	Crop	Cumulative Income since inception (Rs. Million)
1.	Cotton	427,336.00
2	Rice	6,356.00
3	Chickpea	47,430.14
4	Mungbean	30,974.79
5	Lentil	214.36
Total: (Rs. Million)		512,311.29
(Rs. Billion)		512.3
(US\$ Billion)		5.123



Approved Varieties Of NIA (30)

Wheat (13)

Variety	Year
Jauhar	1979
Sindh	1982
Sarsabz	1986
Soghat	1991
Kiran	1996
Marvi	2002
Bhittai	2004
Sassui	2006
Khirman	2006
NIA-Amber	2010
NIA-Sunhari	2010
NIA-Sundar	2012
NIA-Sarang	2013

Rice (06)

Variety	Year
Shadab	1987
Shua-92	1993
Sarshar	2002
Shandar	2006
Khushboo-95	1996
Mehak	2006

Sugarcane (04)

Variety	Year
NIA-98	1998
NIA-2004	2004
NIA-2010	2011
NIA-2011	2014

Cotton (4)

Variety	Year
Chandi-95	1996
Sohni	2002
Sadori	2006
NIA-Ufaq	2010

Mungbean (01)

Variety	Year
AEM-96	1998

Lentil (01)

Variety	Year
NIA-Masoor-05	2006

Brassica (01)

Variety	Year
NIA-Surhan	2013



Approved Varieties Of NIAB (43)

Cotton (14)

Variety	Year
NIAB-78	1983
NIAB-86	1990
NIAB-26	1992
Karishma	1996
NIAB-999	2003
NIAB-111	2004
NIAB-846	2008
NIAB-777	2009
NIAB-852	2012
NIAB-112	2013
NIAB-Kiran	2013
IR-NIAB-824	2013
NIAB-2008	2016
NIAB-878B	2017

Castor (01)

NIAB GOLD	2017
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Rice (05)

Kashmir Basmati	1977
Niab-Irri-9	1999
NIAB-Rice-2013 (RSP-2)	2013
NIAB-Basmati-2016	2016
NOOR BASMATI	2017

Chickpea (06)

CM-72 (D)	1983
CM-88 (D)	1995
CM-98 (D)	1998
CM-2000 (K)	2000
CM-2008 (K)	2008
NIAB-CH2016 (D)	2016

Sesame (02)

NIAB-Sesame2016	2016
NIAB PEARL	2017

KINNOW (01)

NIAB KINNOW	2017
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Mungben (12)

Variety	Year
NM-28	1983
NM-121-25	1986
NM-19-19	1986
NM-20-21	1986
NM-13-1	1986
NM-51	1990
NM-54	1990
NM-92	1996
NM-98	1998
NM-2006	2006
NIAB Mung 2011	2011
NIAB Mung 2016	2016

Lentil (02)

Masoor 2002	2002
Masoor 2006	2006



NIAB 78 (1983)

- Mutant resulting from irradiation of F₁ of AC 134 X Deltapine.
- High yield, early maturity, heat tolerance, Shorter and suitable plant structure, Better response to fertilizer, and wider adaptability.
- **NIAB-78 covered about 70.8% of total cotton area in Punjab in 1988**
- **Spread gradually to Sindh starting from 1992-93 and covered almost all the area under cotton crop in Punjab and Sindh province**
- **By the introduction of this variety, the production of cotton in Pakistan increased from 3 million bales in 1983 to 12.8 million bales (4 times) in 1991-92.**
- **It is estimated that during the 10 years following its release, it contributed more than US \$ 3 billion in cotton production.**



REA (%) UNDER DIFFERENT COTTON VARIETIES GROWN IN PUNJAB 1980-2007

YEARS	MAIN CULTIVARS				VARIETIES CULTIVATED < 10 %
1980-81	B-557 (70)	MNH-93 (15)	NIAB-78 (5)	CIM-70 (2)	BS-1
1981-82	B-557 (55)	MNH-93 (35)	NIAB-78 (7)	CIM-70 (2)	BS-1
1982-83	MNH-93 (56)	NIAB-78 (20)	B-557 (15)	CIM-70 (4)	UAV
1983-84	MNH-93 (62)	NIAB-78 (24)	B-557 (10)	CIM-70 (2)	BS-1, MS-84, UAV
1984-85	NIAB-78 (30)	MNH-93 (28)	B-557 (5)	CIM-70 (4)	MNH-129, UAV
1985-86	NIAB-78 (44)	MNH-93 (20)	B-557 (4)	CIM-70 (3)	SLS-41, MNH-129
1986-87	NIAB-78 (65)	MNH-93 (20)	CIM-70 (4)	B-557 (2)	MNH-129, GOHAR-87, FH-87
1987-88	NIAB-78 (70)	MNH-93 (15)	CIM-70 (6)	B-557 (1)	GOHAR-87, MNH-129, SLS-41, UAV
1988-89	NIAB-78 (65)	MNH-93 (16)	CIM-70 (8)	S-12 (6)	NIAB-86 , CIM-109, GOHAR-87, UAV
1989-90	NIAB-78 (63)	MNH-93 (14)	CIM-70 (7)	S-12 (14)	FH-87, RH-1, CIM-109
1990-91	NIAB-78 (45)	S-12 (40)	CIM-109 (5)	CIM-70 (2)	UAV
1991-92	S-12 (42)	NIAB-78 (39)	CIM-109 (10)	MNH-93 (10)	CIM-240, BH-36, MNH-147, FH-682
1992-93	S-12 (46)	NIAB-78 (32)	CIM-109 (8)	MNH-93 (8)	CIM-70, S-14, BH-36, MNH-147, N-26, UAV
1993-94	NIAB-78 (38)	S-12 (16)	MNH-93 (12)	CIM-240 (10)	UAV, BH-36, MNH-147, FH-682, S-14
1994-95	CIM-240 (36)	NIAB-78 (23)	CIM-109 (10)	S-12 (6)	MNH-93, BH-36, MNH-147
1995-96	CIM-240 (49)	NIAB-78 (17)	CIM-109 (7)	S-12	BH-36, MNH-93, S-14, SLS-1, MNH-147
1996-97	CIM-240 (60)	NIAB-78 (18)	BH-36 (2)	S-12 (2)	NIAB KRISHMA , CIM-1100, CIM-448, CIM-109
1997-98	CIM-240 (24)	N. KRISHMA(17)	CIM-1100 (16)	NIAB-78 (11)	CIM-448, MNH-93, SLS-1, CIM-435, CIM-109, S-12, MNH-147, S-14, AC-134
1998-99	N.KRISHMA(21)	CIM-448 (19)	CIM-240 (11)	CIM-1100 (9)	CIM-443, NIAB-78 , CIM-435, CIM-446, CIM-109, BH-36, MNH-93, SLS-1
1999-00	N.KRISHMA(21)	CIM-448 (18)	CIM-446 (16)	CIM-443 (10)	CIM-435, CIM-240, BH-36, NIAB-78 , CIM-109, VH-53, CIM-1100, BH-95, MNH-93
2000-01	CIM-446 (31)	N.KRISHMA(17)	CIM-448 (10)	CIM-443 (9)	BH-36, VH-53, CIM-240, NIAB-78 , CIM-109, CIM-435, BH-95, CIM-1100, SLS-1, MNH-93
2001-02	CIM-446 (26)	N.KRISHMA(14)	FH-901 (8)	CIM-448 (7)	CIM-443, FH-900, BH-118, BH-36, CIM-109, NIAB-98 , NIAB-78 , CIM-240,, VH-53, SLS-1, CIM-1100
2002-03	CIM-446 (18)	CIM-473 (15)	N.KRISHMA(11)	FH-901 (8)	BH-118, CIM-448, CIM-109, NIAB-78 , CIM-240, CIM-443, CIM-482,
2003-04	CIM-473 (27)	CIM-446 (13)	CIM-499 (11)	FH-901 (8)	FH-1000, FH-900, CIM-482, CIM-443, N.KRISHMA , NIAB-78 , CIM-109, CIM-240, CIM-448
2004-05	CIM-499 (20)	CIM-473 (18)	FVH-142 (12)	CIM-496 (12)	CIM-446, NIAB-111 , BH-180, FH-900, FH-901, FH-1000
2005-06	CIM-496 (32)	CIM-499 (16)	CIM-473 (11)	BH-180 (8)	CIM-506, FVH-142, NIAB-111 , CIM-446, S-2000, FH-901, FH-900, FH-1000, NIAB-999
2006-07	CIM-496 (43)	CIM-499 (9)	CIM-506 (8)	CIM-473 (8)	Bt, BH-180, FVH-142, CIM-446, NIAB-111 , NIAB-999



NIAB-KARISHMA (1996)



NIAB-Karishma Adapted and very popular variety in Sanliurfa, Turkey

Gene pool developed by NIAB and used in the evolution of cotton varieties by different organizations in Pakistan

Varieties	Mutant used	Year of Approval	Organization	Specific Attributes of Mutants
Shaheen	H ₁	1988	C.R.S. Ghotki, Sind.	High yield, early maturity, short internode
NIAB-86	H ₁ , -9-6-2	1990	NIAB, Faisalabad	Better plant type, short internode, and high yield
CIM-109	NIAB-78	1990	C.R.I. Multan	Early maturity, high yield.
SLH-1	St-3	1991	A.R.S.Sahiwal	Short internode, early and uniform maturity, heat tolerant.
Cris-9	St-3	1991	C.R.I., Multan	Short internode, early maturity.
Cris-6	NIAB-78	1991	C.R.I., Multan	High yield, heat resistant.
NIAB-Karishma	NIAB-86	1996	NIAB, Faisalabad	Better plant type, shorter internode, high yield.
NIAB-999	(F1 hybrid seed (H1 x LRA))	2003	NIAB, Faisalabad	Very early, heat tolerant
NIAB-111	NIAB-313/12x CIM-1100 gamma rays	2004	NIAB, Faisalabad	Very early, heat tolerant), long and fine fiber

ACHIEVEMENT AWARD

is hereby bestowed upon

Nuclear Institute for Agriculture and Biology

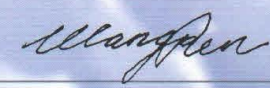
Pakistan Atomic Energy Commission, PAKISTAN

in appreciation and recognition of the contribution to food security and sustainable agricultural development through Plant Mutation Breeding

granted on September 2014, Vienna, Austria


Mr Aldo Malavasi
Deputy Director General
International Atomic Energy Agency




Mr Ren Wang
Assistant Director General
Food and Agricultural Organization of the United Nations

Dr. Khan ICAC 2017

