Pakistan soil resources, issues, threats, ongoing activities and their sustainable management

Prof. Dr. Muhammad Arshad

Tamgha-i-Imtiaz

Distinguished National Professor

President, Soil Science Society of Pakistan

Dean, Faculty of Agriculture
University of Agriculture, Faisalabad-Pakistan

2015 International Year of Soils

Asian Soil Partnership Consultation Workshop on Sustainable Management and Protection of Soil Resources (Bangkok, Thailand: 13-15 MAY, 2015)

National Soil Resources of Pakistan

Total area **79.6 mha**	**Arid 41 mha**	**Deserts** **(climate hyper-arid)** **11 mha**
Semiarid 36.9% **Sub-humid 5.4%** **Mixed 6.2%**	**Cultivated area** **22 mha** **(27.6%)**	**Rangelands** **45.2 mha** **(60.1%)**
Forest area 3.5 mha	**Canal irrigated 25 %** **Tube well irrigated** **=75 %**	**Salt: affected area** **6.69 mha**

Importance of Pakistan in World of Agriculture

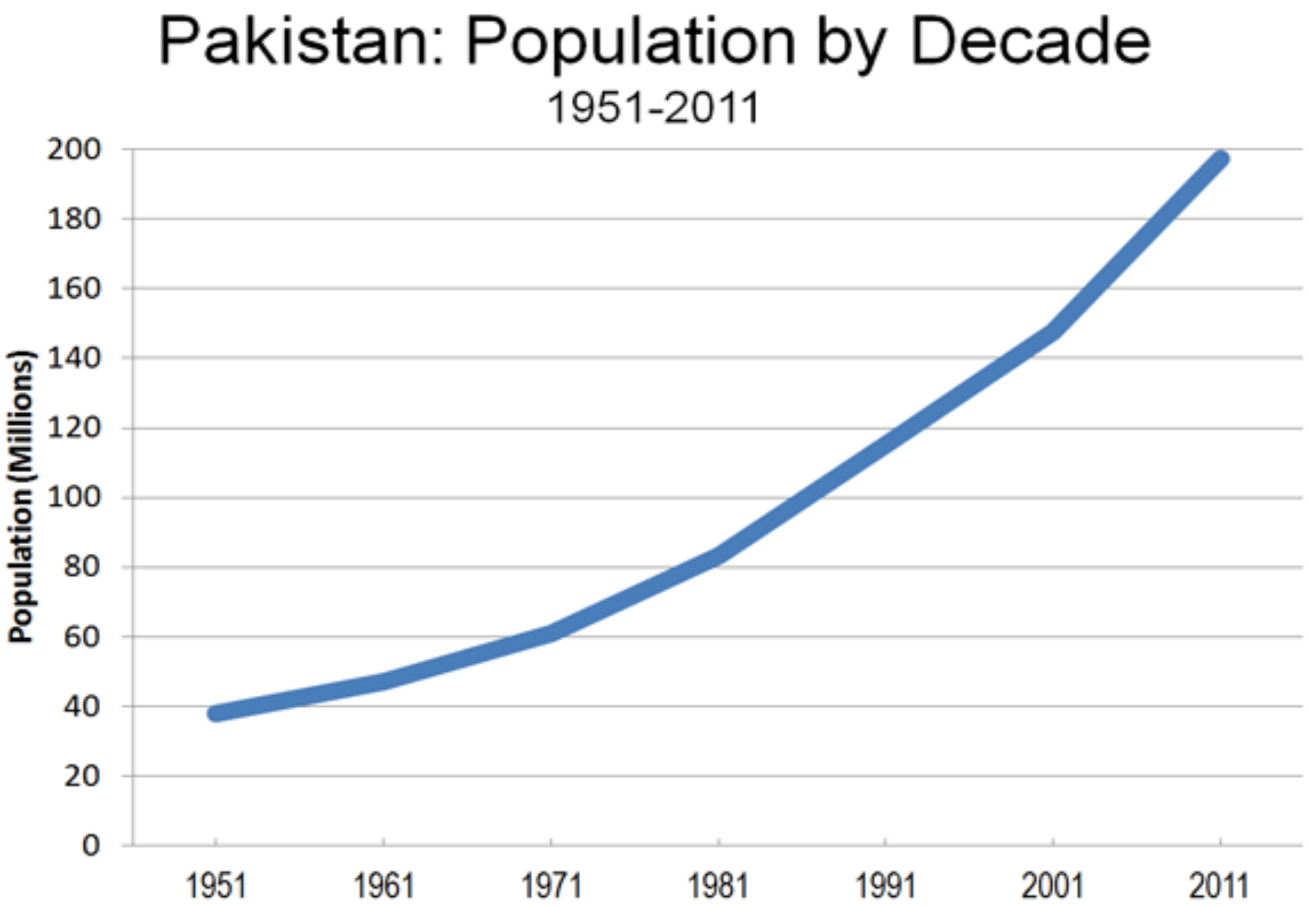
- **Wheat (9th)**
- **Cotton (4th)**
- **Rice (8th)**
- **Sugarcane (4th)**
- **Mango (7th)**
- **Apricot (4th)**
- **Onion (5th)**
- **Date Palm (6th)**
- **Oranges (10th)**

Pakistan ranks 20th worldwide in farm output.

Growth Rates (%)

	GDP	Agriculture	Manufacturing	Services
1960s	6.8	5.1	9.9	6.7
1970s	4.8	2.4	5.5	6.3
1980s	6.5	5.4	8.2	6.7
1990s	4.6	4.4	4.8	4.6
2000s	4.8	3.2	7.0	5.3
2012-13	3.6	3.3	3.4	3.7

Challenge I: Population



Year	Population Million
2015	188.1
2020	203.5
2025	218.1
2030	231.7

Future crop production estimates

(m tons)

Crop	Current	2015	2030
Wheat	21.7	25.4	33.0
Cotton (m bales)	12.4	21.5	29.2
Rice	5.5	7.5	8.5
Sugarcane	44.6	-	-
Maize	3.1	-	-

Major threats and issue of Pakistan Agriculture

A) Soil Health

B) Farm Inputs

C) Climate Change

D) Agricultural Credit

E) Farm Mechanization

F) Agricultural Marketing

G) Extension Services

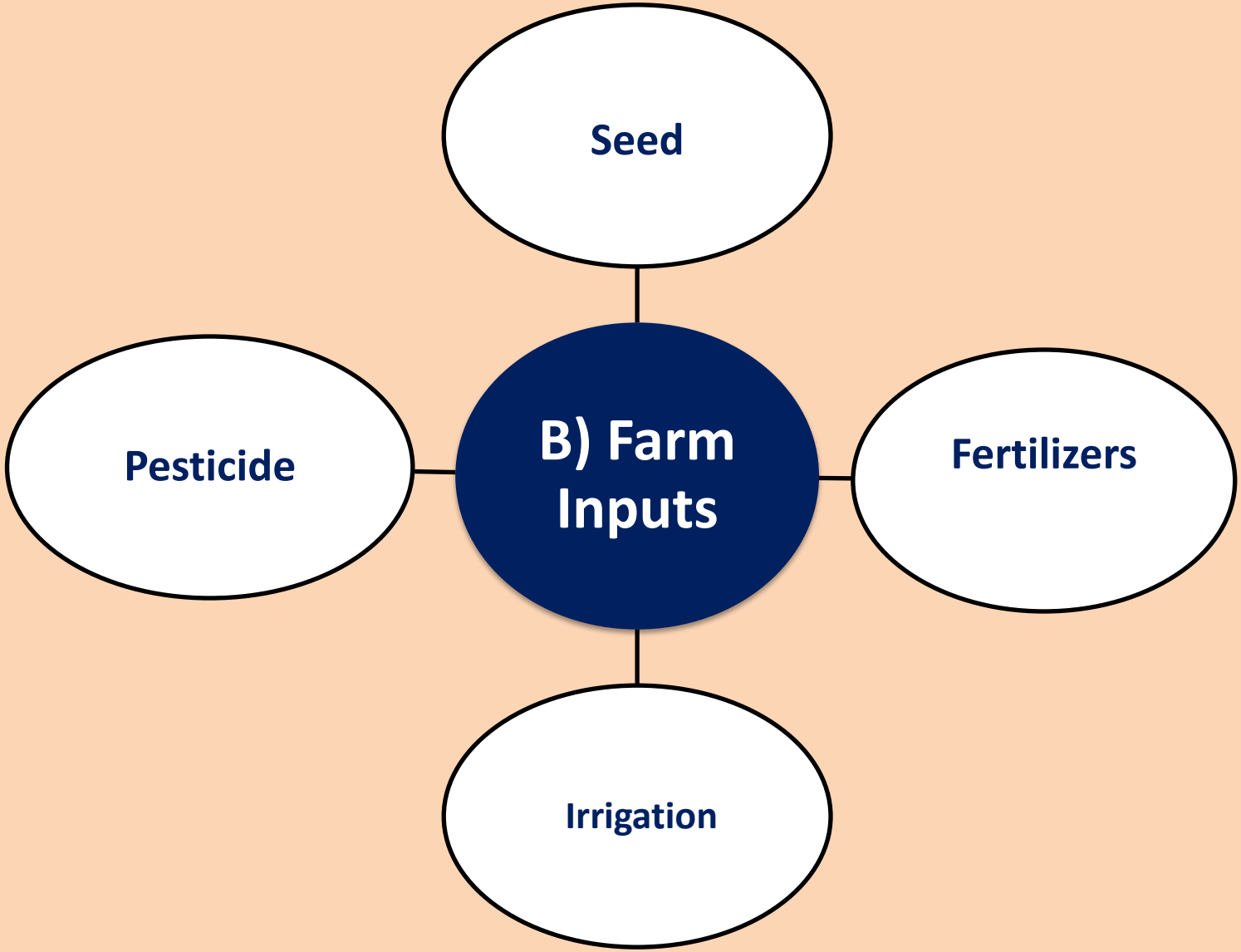
A) Soil Health

Salinity/Sodicity | **Soil Erosion** | **Waterlogging**

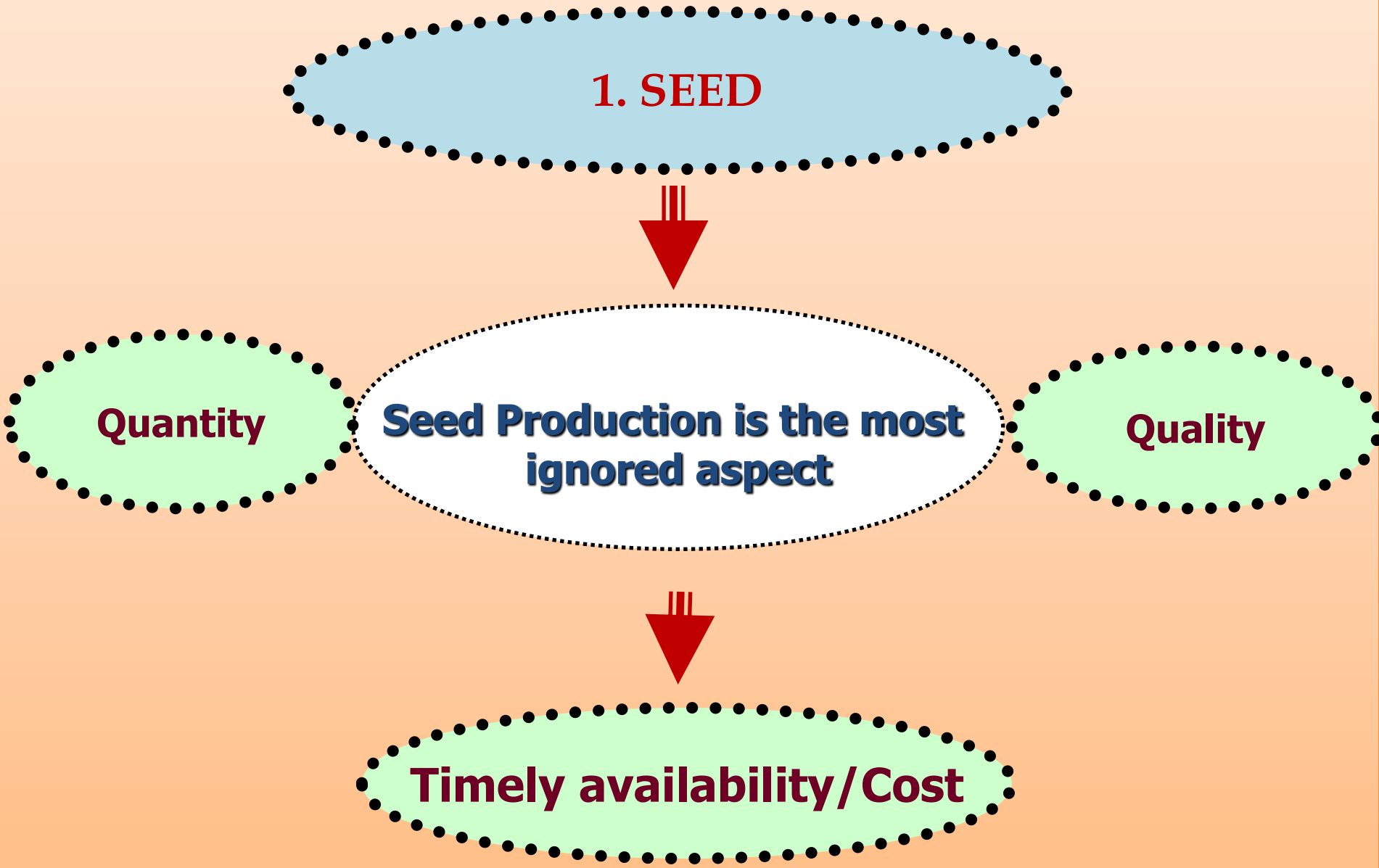
Threats

- Intensive cropping system
- Harsh climate
- Poor OM content
- Over Mechanization
- Poor Quality water

Poor soil health is threat to Food Security

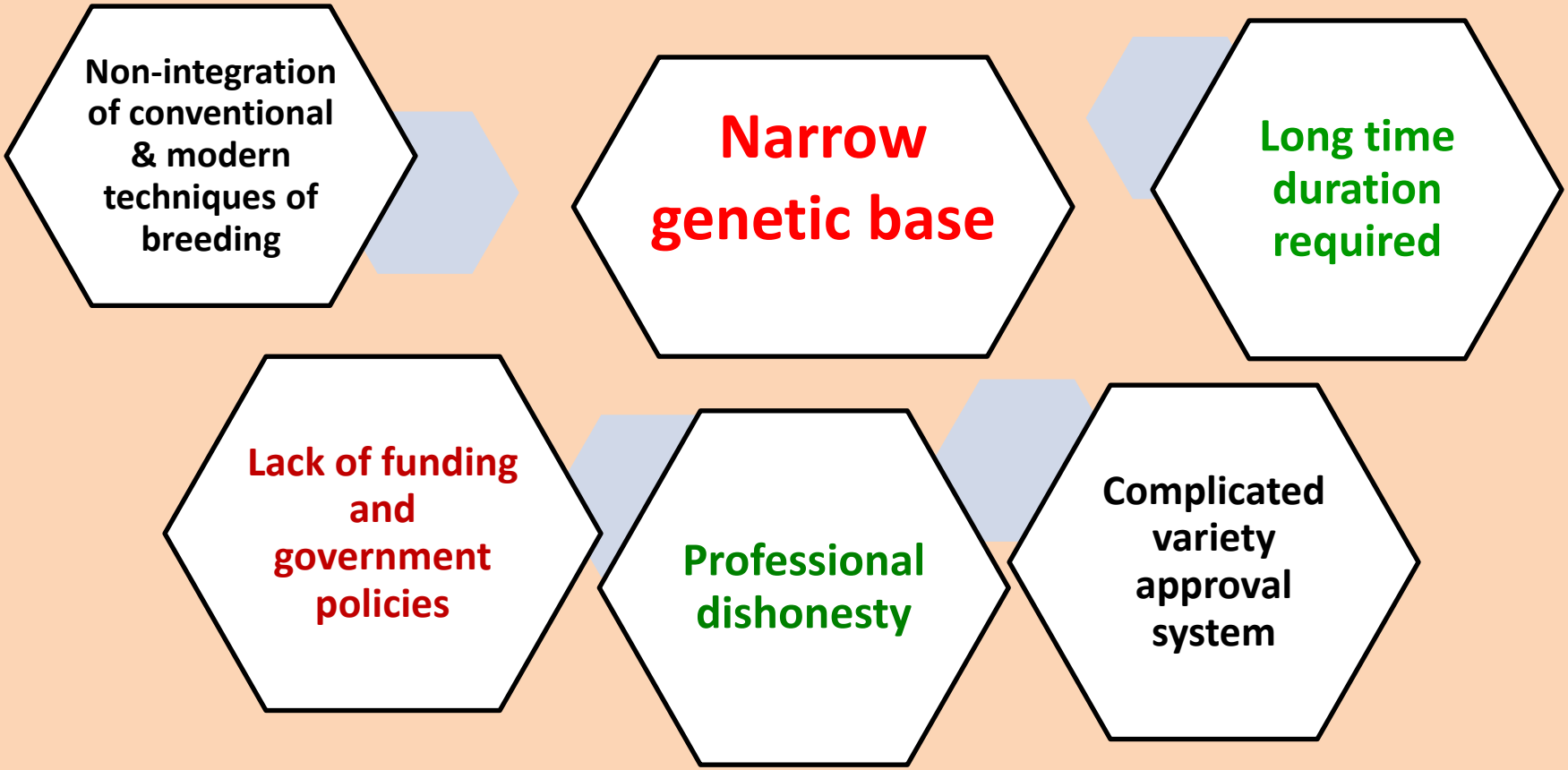


Proper use of inputs is a key to food security/ Sustainable soil management


1. SEED
Quantity
Seed Production is the most ignored aspect
Quality
Timely availability/Cost

Variety Development

Development of new varieties is pre-requisite for enhancing agricultural growth & food security



2. Fertilizers

- Imbalance Use
- Soil degradation
- Fertilizer Use efficiency
- Urea / phosphorus
- Excessive use of nitrogen
- Timely availability

3. Irrigation

Less amount available	Cropping pattern for WUE	Water harvesting
Poor quality	Water saving	Recycling wastewater
WUE	Tube-well water	Lack of planing

4. Pesticide

Quality issue

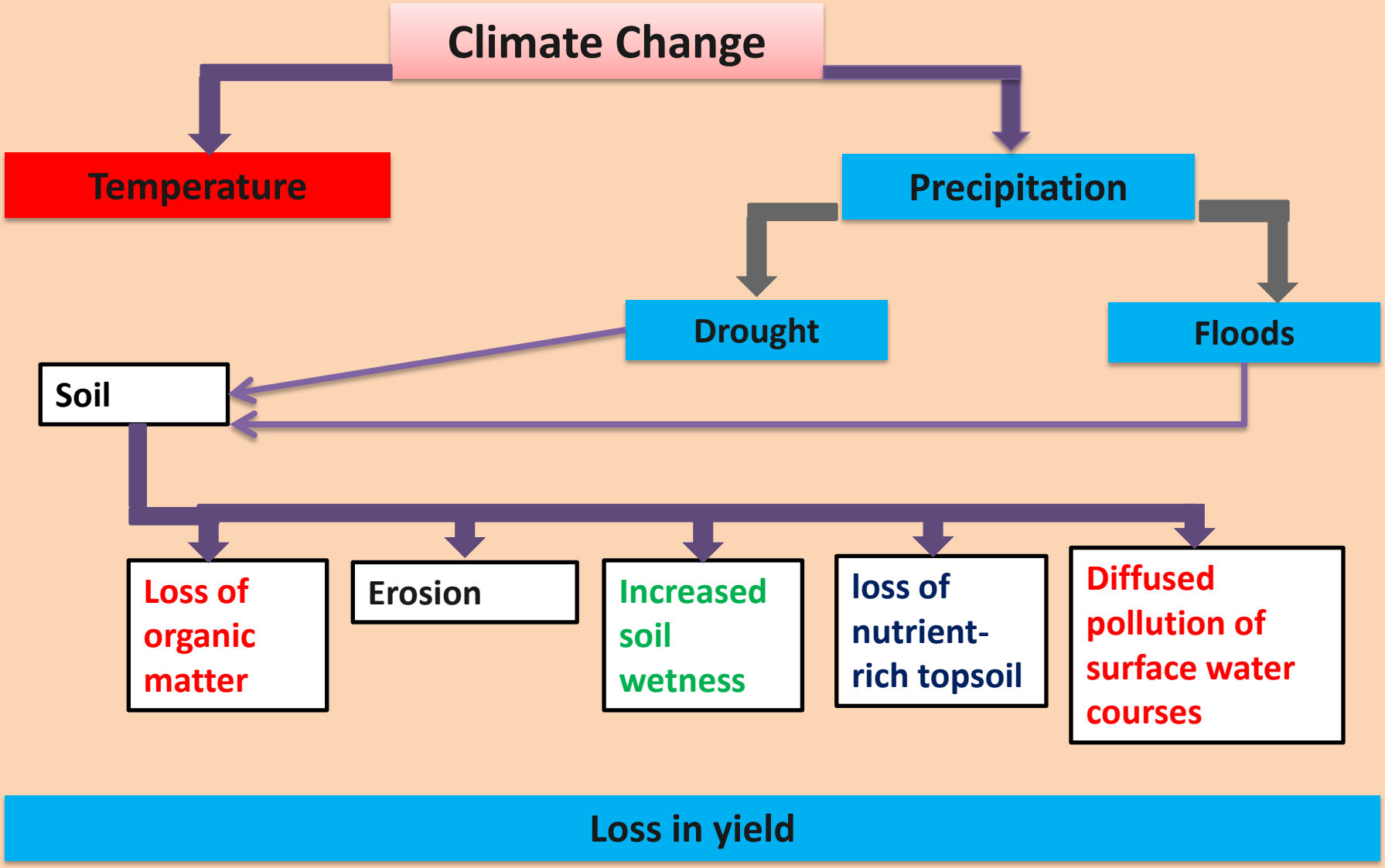
Cost issue

Environmental issue

Bio-control

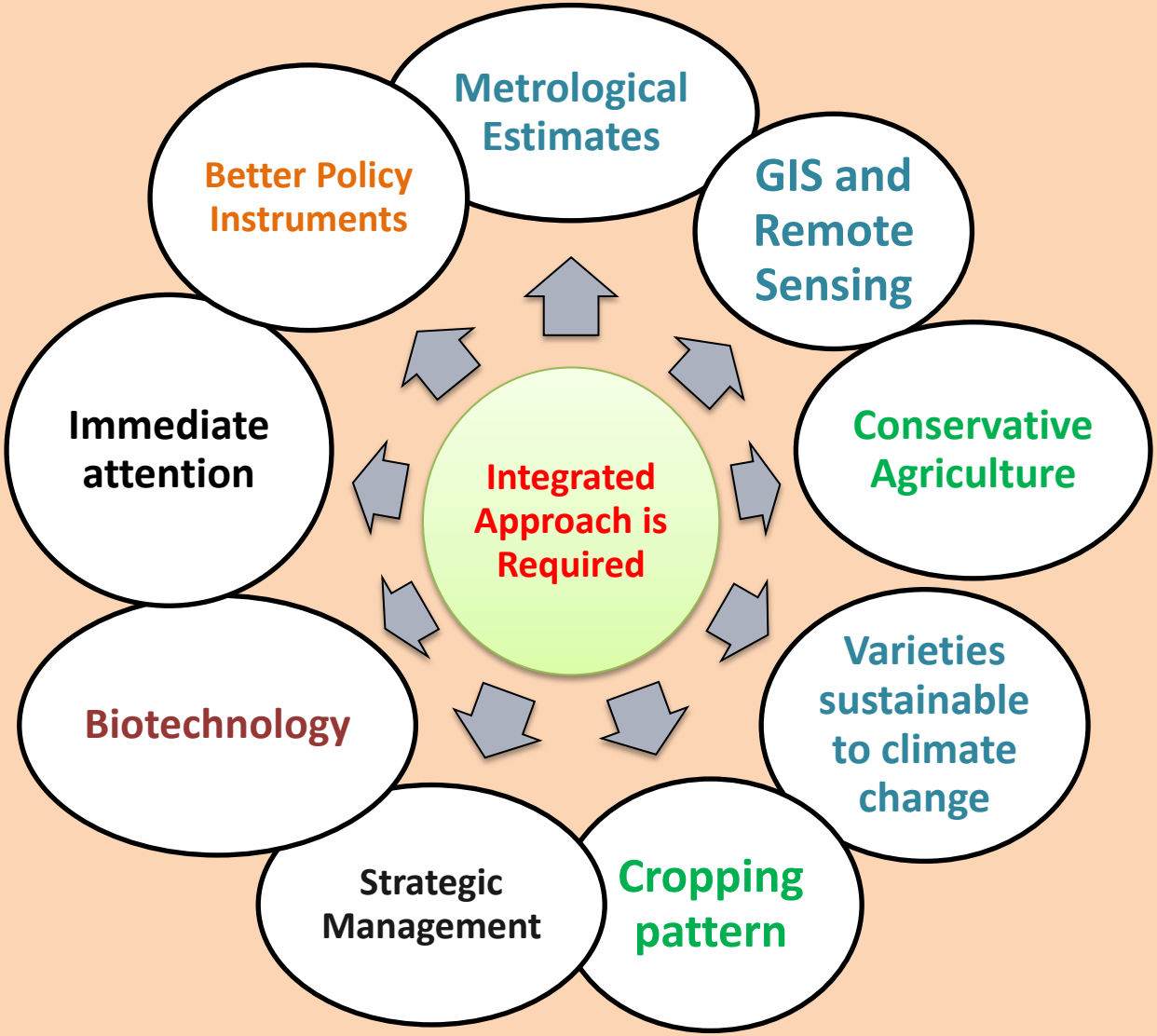
Govt. policies

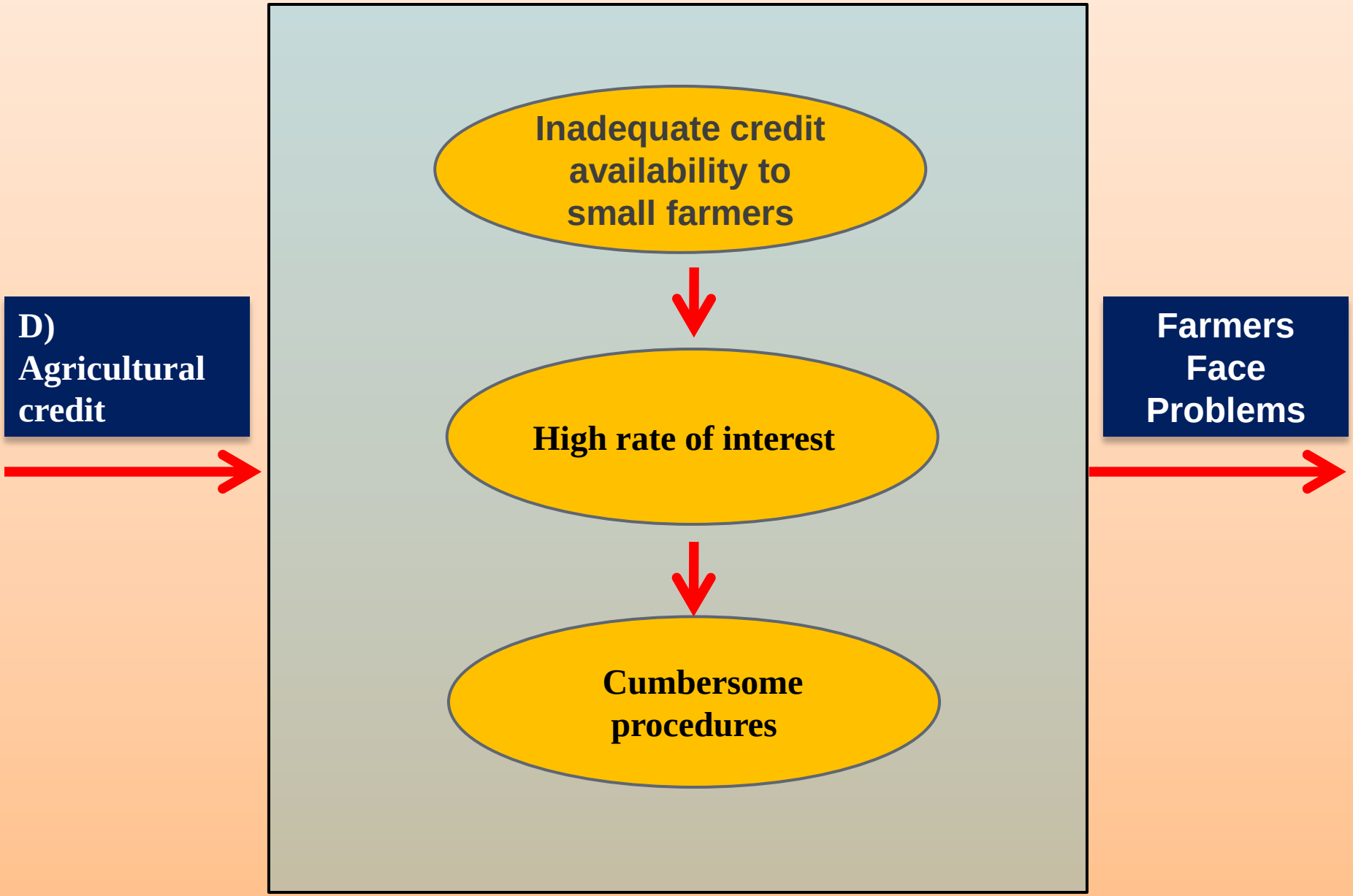
C) Effects of Climate Change on Soil

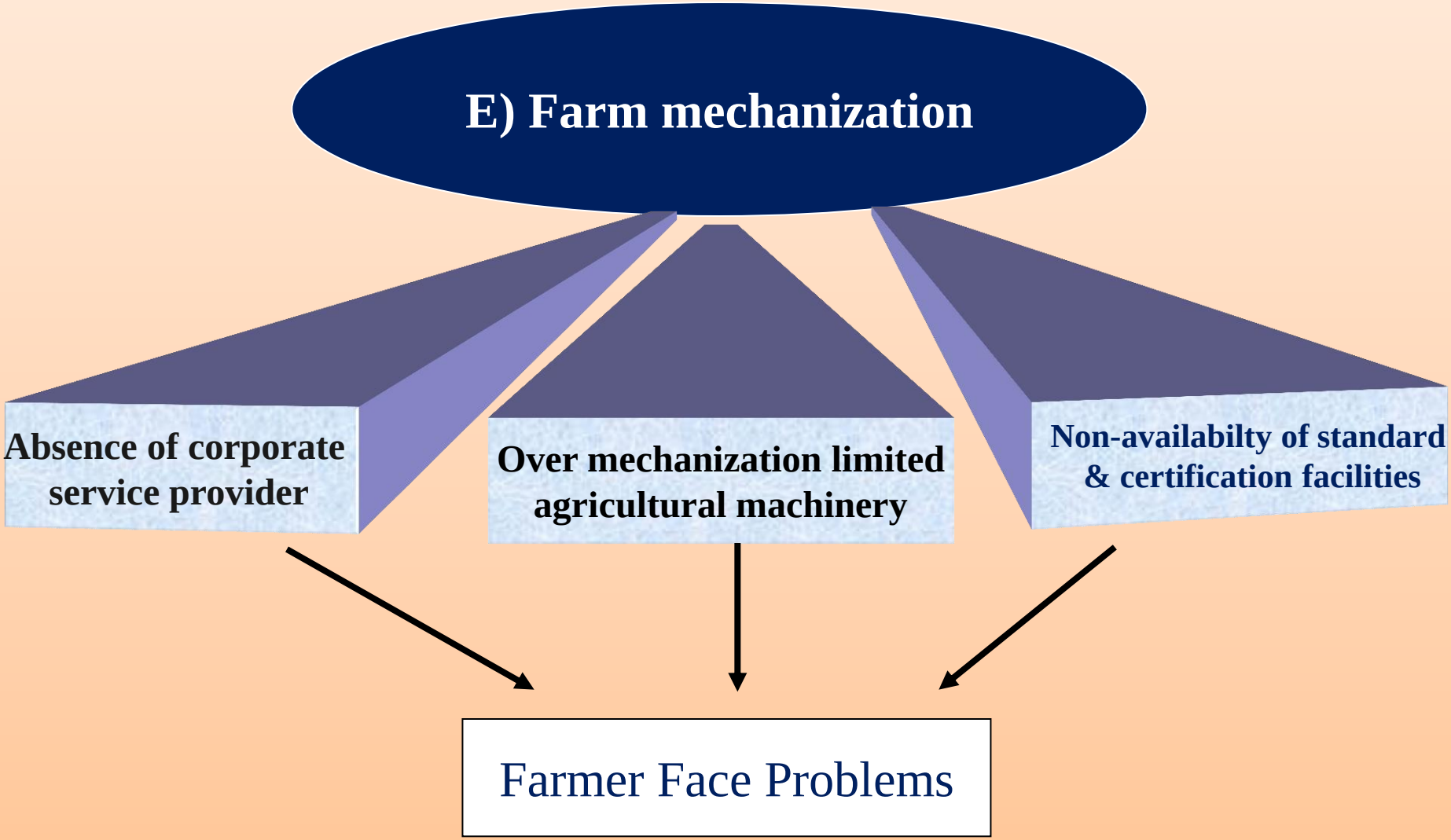


Climate Change

Climate change is inevitable and ever-continued. No single approach will be effective, only multi disciplinary integrated approach can work.




D) Agricultural credit
Inadequate credit availability to small farmers
High rate of interest
Cumbersome procedures
Farmers Face Problems


E) Farm mechanization
Absence of corporate service provider
Over mechanization limited agricultural machinery
Non-availabilty of standard & certification facilities
Farmer Face Problems

F) Agriculture marketing & forecasting

Inefficient and corrupt market committees system

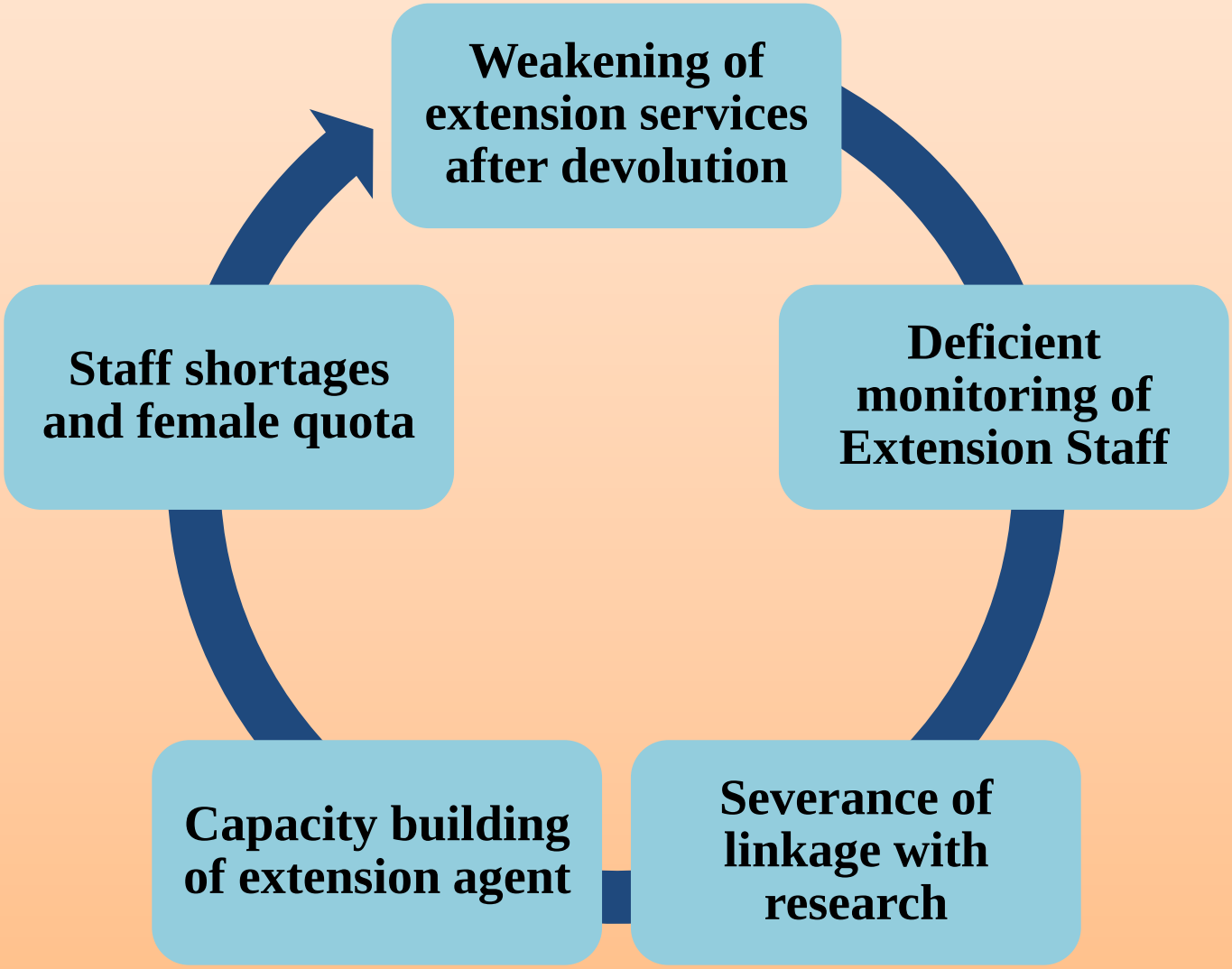
Exploitative role of the middleman

Volatility in prices of essential commodities

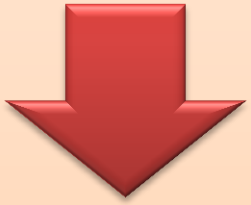
Poor forecasting system

No system for grading and quality premium

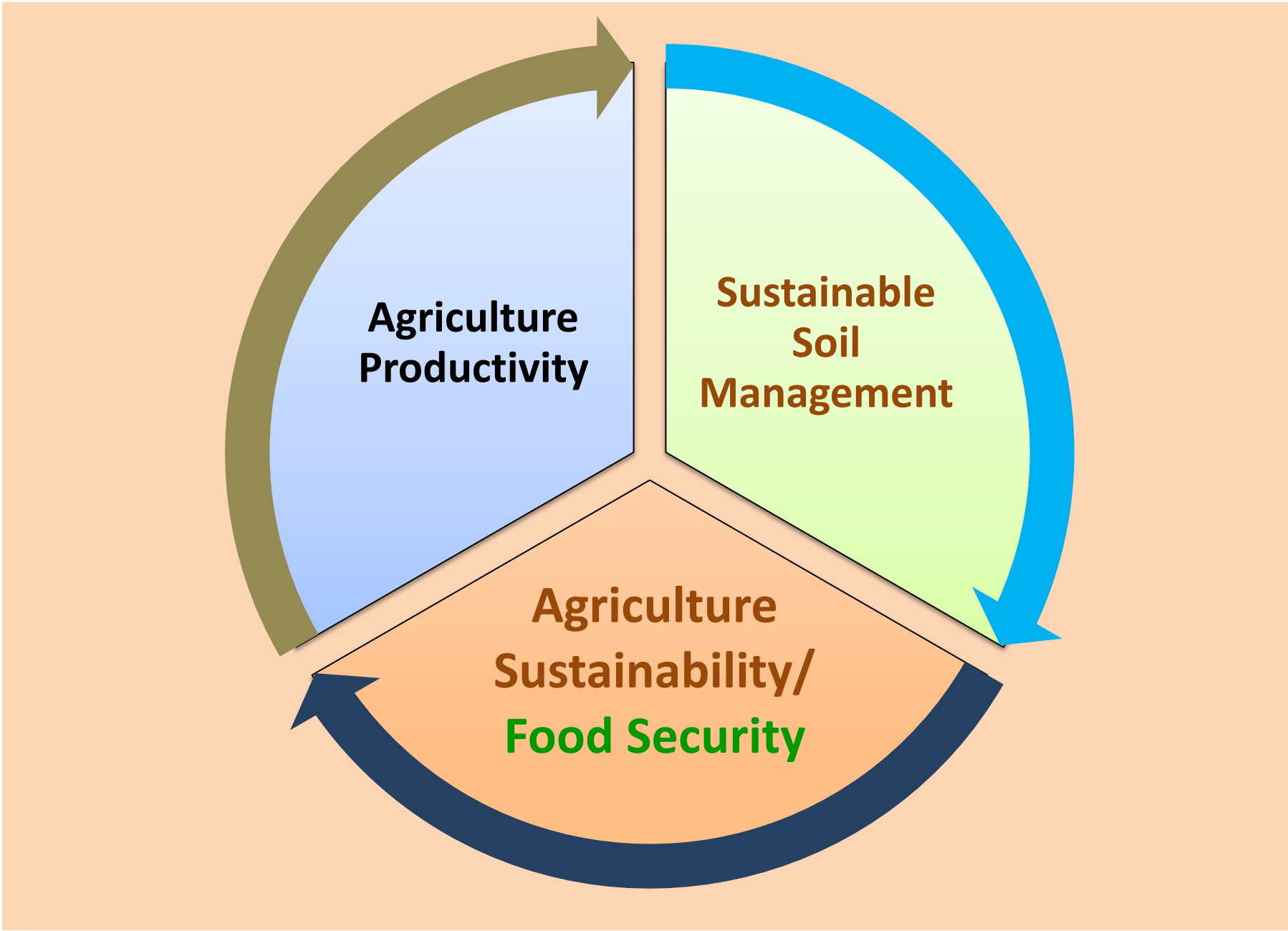
G) Farm Extension Services



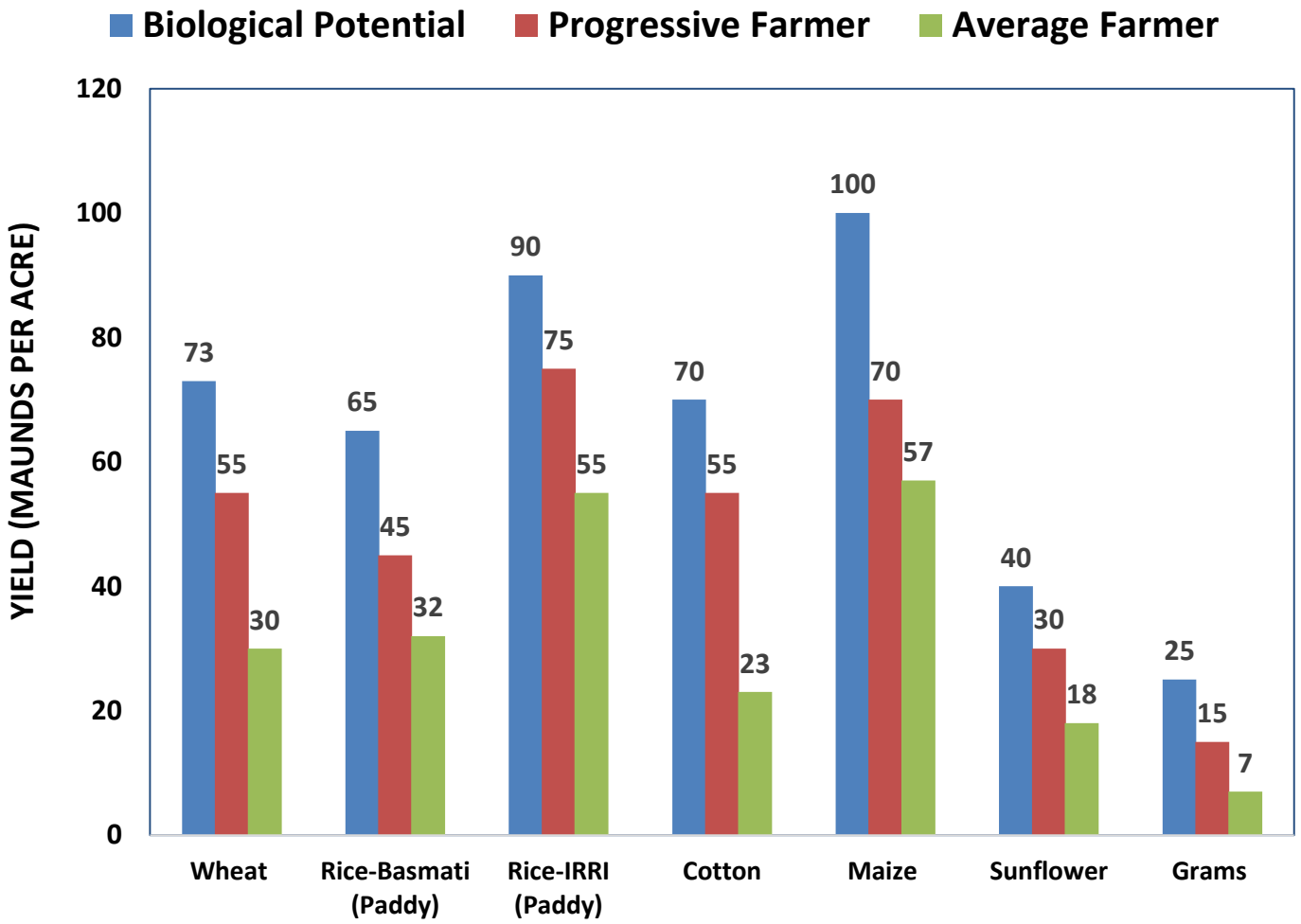
Today's Challenge



How Agricultural Productivity could be enhanced on sustainable basis to ensure food security for 200 million people without disturbing the ecosystem


Agriculture Productivity
Sustainable Soil Management
Agriculture Sustainability/ Food Security

BRIDGING THE YIELD GAP – THE CHALLENGE

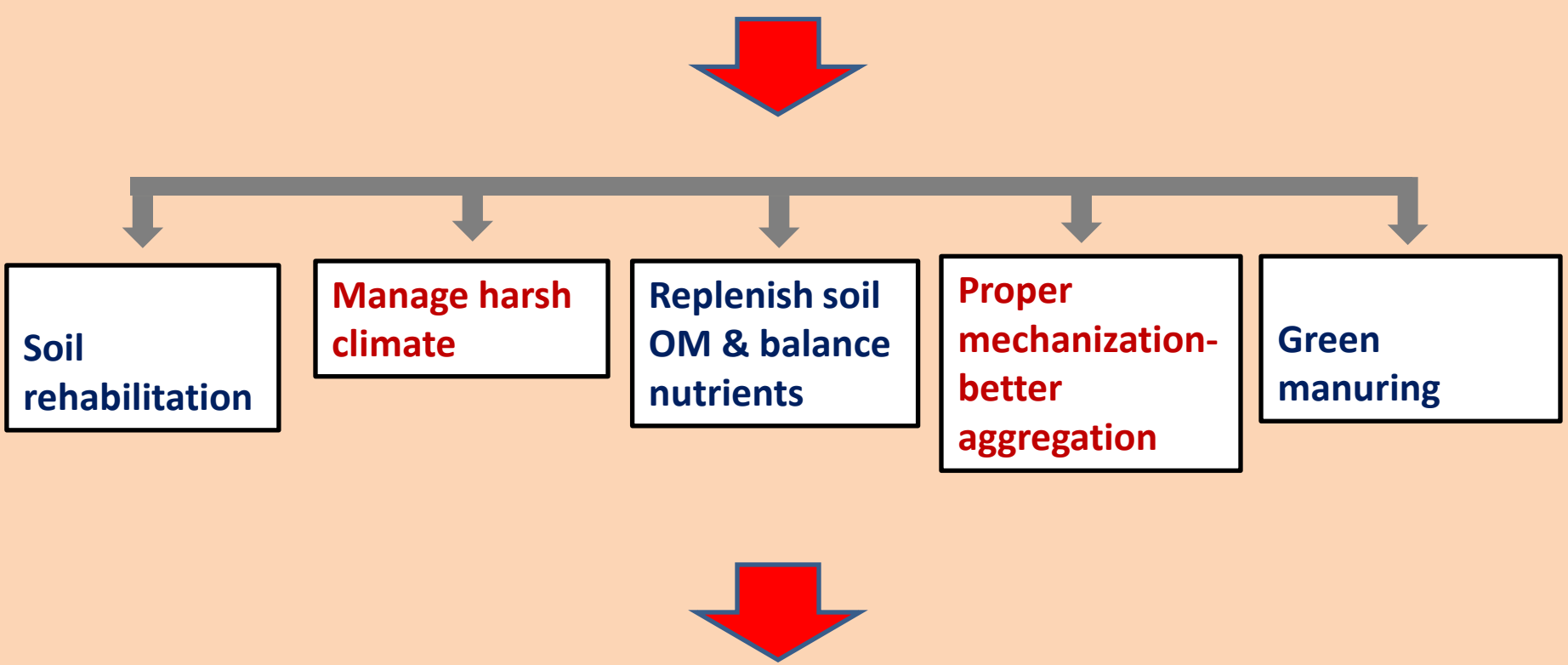


Progressive Farmers

Better information	Optimal inputs
Proactive management	Timely actions
Better networks	Quality inputs
Bigger farms	Mechanized farming
Greater economic base	Maximum efficiency

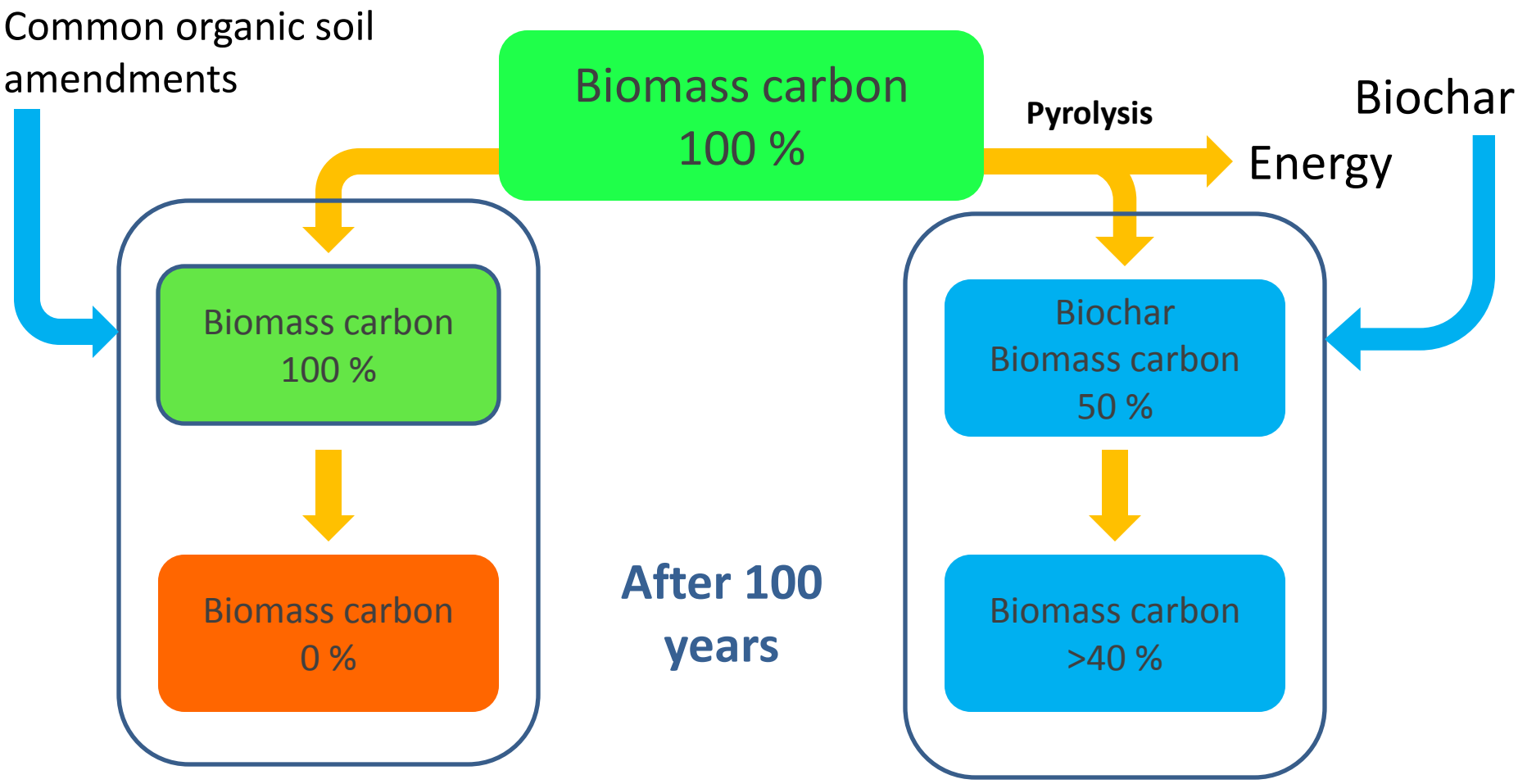
The relevant gap that can be narrowed

National Priorities for Sustainable Soil Management



Sustainable soil health management is key to food security

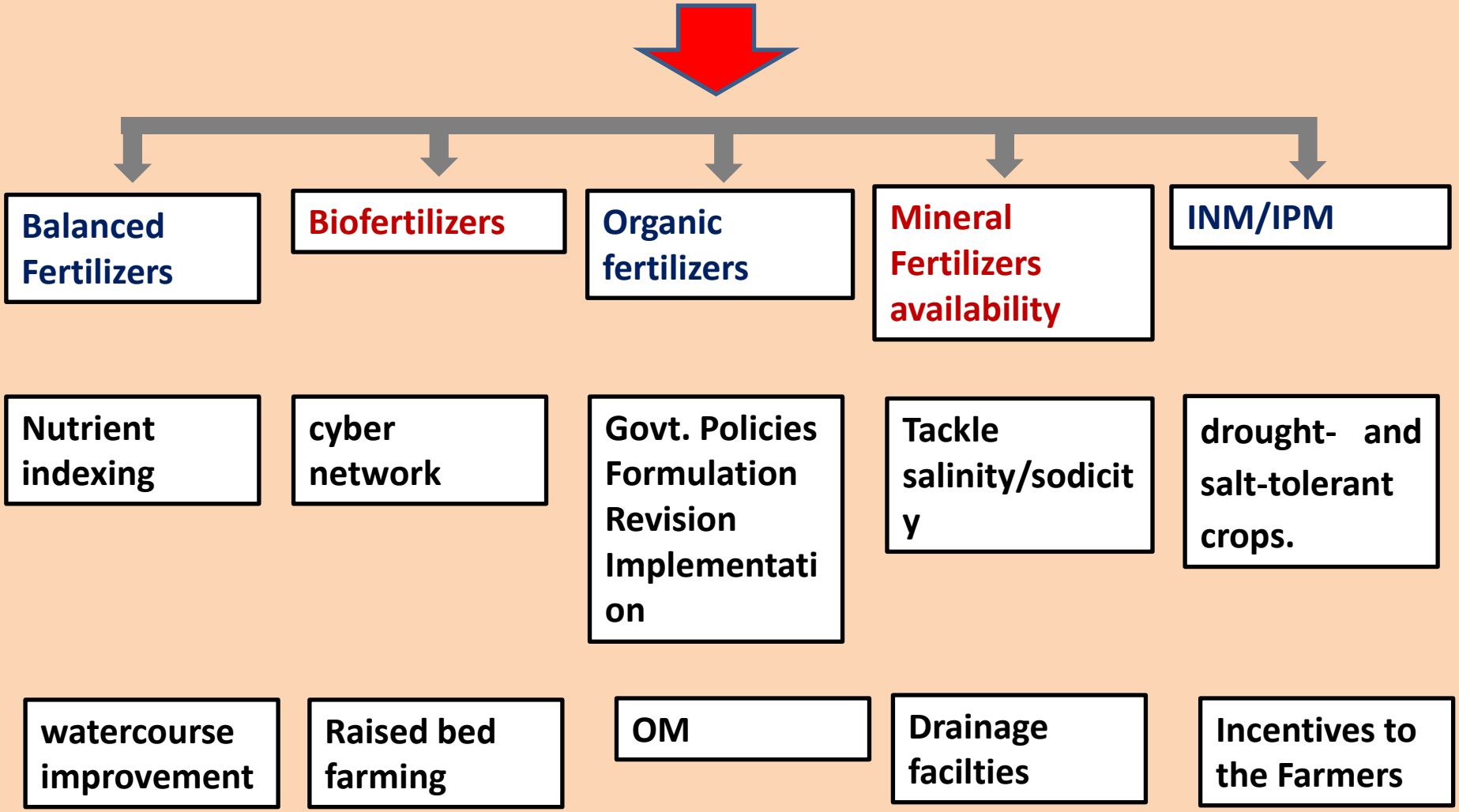
Carbon Sequestration in Soil



Potential to reduce current global carbon emissions by as much as 10%

Woolf et al., 2010

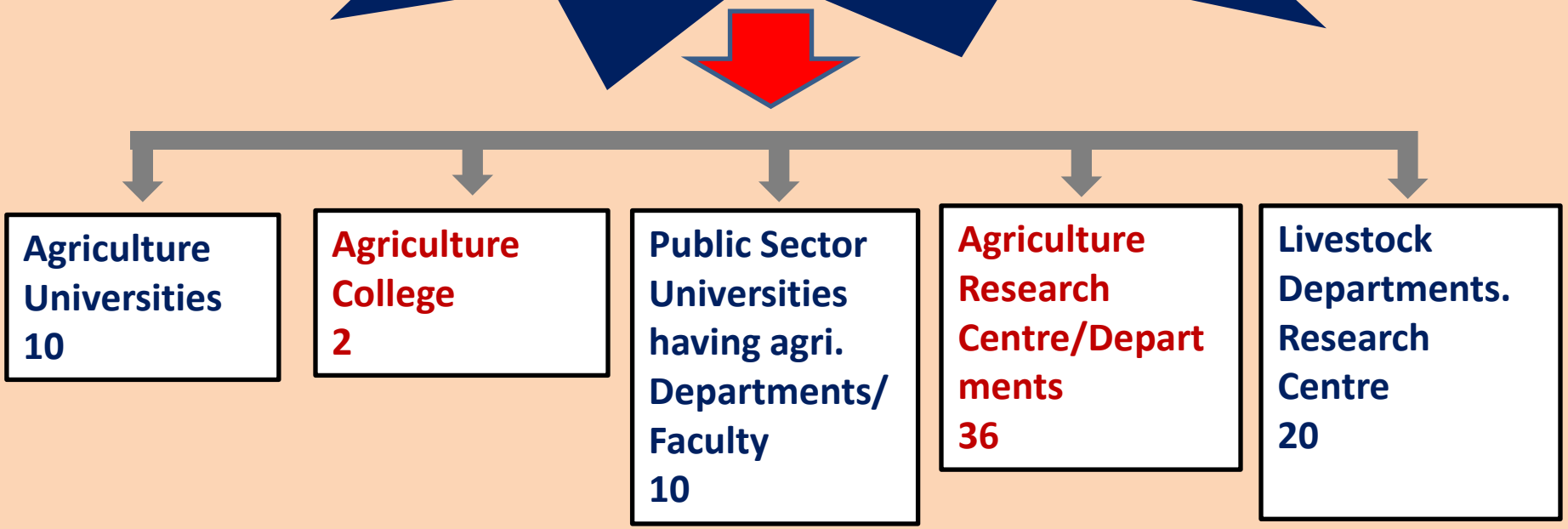
On going activities for sustainable management and protection of soil resources



Bridging the yield gap between the potential and the present level of productivity through

Acceleration of seed production	Timely supply of inputs	Innovative products
Time of application	Method of application	IPM/INM
Best agronomic practices	National Policies	Farmers visits and training

Role of Research and development organizations in agriculture development



- Human resource development
- Research & agriculture development for sustainable soil management and food security

CONCLUDING REMARKS

- **Better management of soil & water resources**
- **Increase OM in soil**
- **Reclamation of salt affected soil**
- **Novel management techniques / climate change requirements**
- **New varieties / Hybrid and GMOs**
- **Innovative and non-traditional agriculture**
- **Farmers friendly policies (input cost, output price, export, taxation and etc.)**
- **Capacity building**

Thanks.....!