

Fig. 1: Growth rate of agriculture

- Data security: In the ever-increasing era of data breaches, a top cloud computing security solution has security protocols in place to protect sensitive information and transactions. This prevents a third party from eavesdropping or tampering with data being transmitted.
- Regulatory compliance: Top cloud computing security solutions help companies in regulated industries by managing and maintaining enhanced infrastructures for compliance and to protect personal and financial data.
- Flexibility: You have the flexibility to avoid server crashes during high traffic periods by scaling up your cloud solution. Then, when the high traffic is over, you can scale back down to reduce costs.

AGRICULTURE LITERATURE REVIEW

Growth of the agricultural sector

Since the beginning of economic reforms in 1991, growth in agricultural GDP has shown high volatility. It has fluctuated from 4.8% per annum in the eighth 5 years plan (1992–96) to a low of 2.4% during the tenth plan (2002–06) before rising to 4.1% in the eleventh plan (2007–12), as shown in Fig. 1.

Food and Agriculture Organization (FAO) 5.71 India is a founder-member of the FAO and has been taking part in all its activities. India has been availing services from the FAO from time to time in the form of training, consultancy services, equipment, and material in the field of agriculture and allied sectors under its Technical Cooperation Programme.

The World Food Programme (WFP) was set up in 1963 jointly by the United Nations and the FAO. India is a founder-member of the WFP, which is mandated to provide emergency food supply in places facing acute food insecurity due to natural calamities as well as manmade causes. At present, the Country Strategy Programme (CSP) 2015–2018 is under operation, which focuses on reducing hunger and malnutrition among women and children in vulnerable areas, the development of appropriate products to deal with malnutrition at early ages among children and the creation of livelihood opportunities for the poor. The first CPAC meeting was held on August 24, 2015, with all stakeholders of WFP CSP for 2015–18. The WFP has also made notable contributions through product innovations such as India mix and mapping of hunger in India through its food atlases.

India's agriculture trade

India is among the 15 leading exporters of agricultural products in the world. The country has emerged as a significant exporter of certain agri-items such as cotton, rice, meat, oil meals, pepper, and sugar. India has developed export competitiveness in certain specialized agriculture products such as basmati rice, guar gum, and castor. As per the WTO Trade Statistics, India's share in agricultural exports and imports in the world in 2014 were 2.46% and 1.45%, respectively (Fig. 2). Agricultural exports and imports as a percentage of agriculture GDP have also been increasing, as shown in Fig. 5.6.

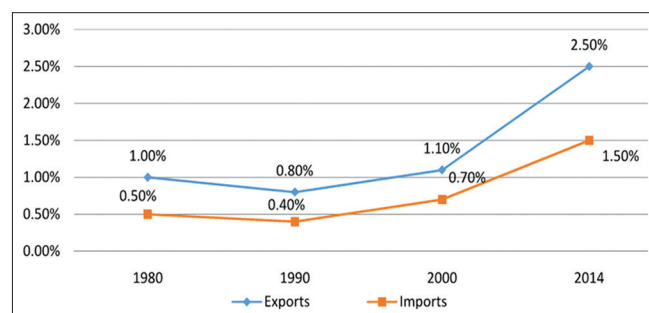


Fig. 2: Imports and exports up to 2014

India's top 10 agriculture commodities imported during the last few years are reported in Table.

Livestock and crop production activities in India generate about 300 crore tonnes of solid biowaste. The safe disposal of agrowaste within short periods is a major concern at the national and international levels. Traditional methods of recycling animal and farm waste take 6 months and yield low-quality organic manure. The exotic earthworm species, *Eisenia foetida* and *Eudrilus eugeniae*, used for vermicomposting generally, cannot survive in high temperatures and humidity and have low fecundity and poor vermicast quality. There is an indigenous earthworm species, *Perionyx ceylensis*, that

1. Thrives on cow dung and crop residue;
2. Adapts to a wide range of temperatures (0°–44°C);
3. Multiplies beneficial soil and fermentation microorganisms; and
4. Is highly prolific.

Mechanization and energy management

Improved machines, implements, and equipment were developed for improving the efficiency of farm operations and resource conservation, in addition to renewable energy technologies and gender-friendly, drudgery-reducing tools developed for women farm workers. These include sugarcane bud chip planting equipment to replace the manual method of sugarcane planting.

Empowering women in agriculture

Conceptual frameworks for developing new gender-related indices for measuring different dimensions of women empowerment in agriculture, farming systems, and gender-friendly technologies were prepared. A multi-story cropping model for a coconut orchard was developed for efficient resource use and to enhance women's participation. The income-generating potential of the second story (banana, papaya, and guava) and ground-story intercrops (cowpea, turmeric, elephant foot yam, and pineapple in the interspaces of the main crop), cultivated by women, was Rs. 414,000 as against Rs. 48,000 in a sole crop. The All India Coordinated Research Projects on home science focused on

1 food and nutrition security in selected farming systems, drudgery
2 assessment, and mitigation, mitigating occupational health hazards,
3 and on capacity development of youth engaged in agriculture and
4 empowerment of women.

6 Fodder and feed development

7 The DADF is implementing the sub-mission on feed and fodder
8 development so as to ensure the availability of fodder. The scheme
9 supports the use of post-harvest technologies to cultivate and preserve
10 fodder. To improve the seed replacement scenario, the department
11 has taken up production of foundation seeds from breeder seeds at its
12 eight regional fodder stations for the last 2 years. For the production of
13 certified seeds from foundation seeds, the department has introduced
14 the "fodder seed procurement and distribution component." After the
15 foundation seeds are produced at all the Department's regional stations,
16 these are offered for further multiplication to state governments,
17 preferably through milk federations, dairy cooperatives, progressive
18 farmers, etc., under a buy-back arrangement for the production of
19 certified seeds.

21 Assistance is provided to states

22 The components of the scheme under the sub-mission on feed and
23 fodder development are as follows.

- 24 1. Forage production from non-forest wasteland/rangeland/grassland/
25 non-arable land.
- 26 2. Forage production from forest land.
- 27 3. Cultivation of coarse grains and dual-purpose crops.
- 28 4. Fodder seed production/procurement and distribution conservation
29 of fodder through post-harvest technologies
 - 30 • Distribution of hand driven chaff cutters
 - 31 • Distribution of power-driven chaff cutters
 - 32 • Establishment of high-capacity fodder block making units
 - 33 • Distribution of low-capacity, tractor-mountable fodder block
34 making units/hay baling machine/reaper/forage harvester
 - 35 • Establishment of silage making units
 - 36 • Establishment of area-specific mineral mixture/feed processing
37 units
 - 38 • Establishment/modernization of feed testing laboratories.

40 New initiatives

41 On the occasion of the 87th ICAR Foundation Day, the Hon'ble Prime
42 Minister, Shri Narendra Modi, launched the following programs at
43 Patna.

- 44 i. Farmer, innovation, resources, science and technology (FIRST): This
45 is an ICAR initiative to move beyond production and productivity
46 and to privilege the complex, diverse and risk-prone realities of
47 most farmers by enhancing contact between farmers and scientists
48 through multi-stakeholder participation. Farmer FIRST aims at
49 enriching the farmer-scientist interface for technology development
50 and application. The program aims to investigate the technical,
51 socioeconomic and environmental impact of the project to develop
52 a database on the performance of the technologies of the National
53 Agricultural Research systems (NARS); farmers' perception of
54 the technologies; agriculture as a profession in rural settings;
55 migration; etc.
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66 the technologies of the NARS; famers' perception of the technologies;
67 agriculture as a profession in rural settings; migration; etc.
- 68 iii. Student Rural Entrepreneurship and Awareness Development
69 Yojana: This is a novel program to integrate skill building and

1 business modules into agricultural education to provide students
2 with the necessary skills to emerge as agri-entrepreneurs. A 1-year
3 composite program in agriculture education was designed with
4 three components – experiential learning, rural agricultural work
5 experience, and in-plant training or industrial attachment.

- 6 iv. Attracting and retaining youth in agriculture: This is an innovative
7 program to retain rural youth in agriculture; respond to the needs
8 of the country; and build capacity among rural youth through
9 special programs and projects, including a "learn while you earn"
10 program. The program shall develop a comprehensive policy for the
11 development of youth in rural areas; involve youth in policymaking
12 processes from design to implementation; and monitor, evaluate and
13 recognize the requirements of new age farmers and endeavor to fulfill
14 the same. Overall, the program aims to check the rural migration of
15 youth, on the one hand, and unviable holdings, on the other hand,
16 that will have a wider impact on food security within the context of
17 the ever-growing population Mera gaon, Mera gaurav: The program
18 brings together agricultural experts from agricultural universities
19 and ICAR institutes to enable effective and deeper diffusion of
20 information on scientific farming in villages. A group of experts will
21 be associated with one particular village to create awareness and
22 help in adopting new technologies, including those that address farm
23 investment, loans, and availability of inputs and marketing.

25 Entrepreneurship development and employment generation (EDEG)

26 Animal farming constitutes the livelihood of the rural poor, who belong
27 to the lowest socio-economic strata and have no means to undertake
28 scientific animal farming with improved foundation stock, proper
29 housing, feeding, and management. Therefore, suitable schemes to
30 popularize scientific animal breeding-cum-rearing of meat-producing
31 animals with adequate financial provisions are necessary to modernize
32 the Indian meat industry and to improve the productivity of small-
33 sized rural farms. The EDEG component of the National Livestock
34 Mission (NLM) encourages commercial rearing of poultry, small
35 ruminants, and pigs by the adoption of scientific methods and the
36 creation of infrastructure. During 2014–15, a total number of 14,488
37 units of poultry, small ruminants and pigs have been assisted for the
38 above activities under the NLM. During 2015–16, 5547 units have been
39 assisted during the first quarter.

42 Agriculture statistics in India

43 The focus of agricultural policy, worldwide, has shifted from merely
44 increasing production to doing so sustainably, while not losing sight
45 of the goals of equity and poverty alleviation. This has increased the
46 demands on agricultural statistics in terms of scope, reliability, and
47 timeliness. There are numerous aspects to agricultural data. These
48 include the structure of agriculture, i.e., agricultural holding by size,
49 operational tenure, land use and input use; and annual agricultural
50 activities which include crop and livestock yield and production, and
51 seasonal information related to cost of cultivation, trade, and prices
52 of agricultural products. Disaggregated agricultural estimates are
53 also required for agricultural planning at the district and lower levels
54 of the administrative hierarchy. The Government of India has evolved
55 statistically sound systems for obtaining reliable data on all the above
56 parameters.

58 Area, production, and yield of agricultural crops

59 All-India estimates of major agricultural crops are prepared on the basis
60 of data received from State Agricultural Statistics Authorities in various
61 states and union territories. State governments prepare their estimates
62 on the basis of area enumeration in a sample of 20% villages and
63 yield assessment through crop cutting experiments (CCEs) conducted
64 in a sub-sample of the villages selected for area enumeration. The
65 fieldwork for area enumeration and CCEs in states and union territories
66 is normally carried out by the staff of the Department of Revenue/
67 Agriculture. A fresh sample of 20% of villages is taken every year so
68 that each of the 600,000 villages in the country is covered over a period
69 of 5 years estimates cover Kharif as well as Rabi crops.

CONCLUSION

Finally, it is clear that India's agricultural sector has made huge strides in developing its potential. This agro-cloud revolution massively increased the production of vital food grains and introduced technological innovations into agriculture. Cloud computing is available for use anytime and anywhere so long as the device is connected to the internet based on the software as a service (SaaS), platform as a service (PaaS), or infrastructure as a service (IaaS) service model [2]. It plays an important role in agriculture for intensive farming by the implementation of the latest technologies. It makes the monitoring of agricultural very simple and easy [1]. Cloud computing facilitates the storage, management, access and giving out of the agriculture information rapidly in low cost. With applications of Agro-cloud, the farmers will be benefitted in the context of higher production, marketing, selling, and decision-making processes.

FURTHER ENHANCEMENT

We are going to develop a Mobile app to send automatic SMS for registered farmers about all updates of government schemes related to

Author Queries???

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AQ4:Kindly check the figure citation

AQ5:Kindly cite references 3 in the text part and also chronological order

agriculture can be presented to the farming community through cloud computing. The primary reason to adopting cloud computing is to help the farmers in taking decision related to production and maintenance.

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