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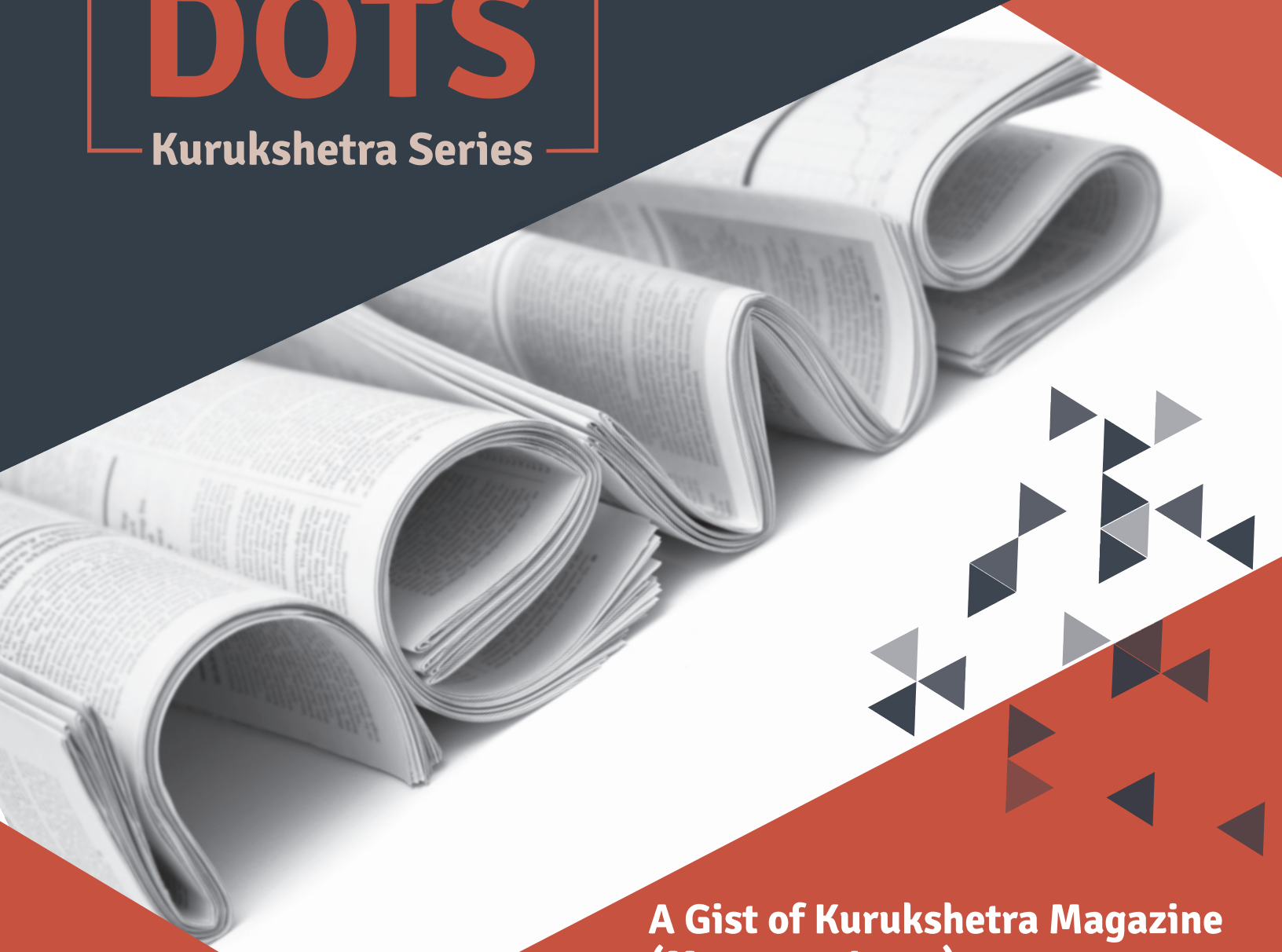

A Gist of Kurukshetra Magazine (May 2019 Issue)

Biofertilizers and Green Manuring

Zero Budget Natural Farming: A Model for the Future

Women in Organic Farming: Agents of Change

Changing Scenario of Organic Farming

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Contents

Kurukshetra Compendium

May 2019

Organic Farming

Organic Farming

- It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (biofertilizers) to release nutrients to crops for increased sustainable production in an eco-friendly pollution free environment.
- As per the definition of the United States Department of Agriculture (USDA) study team on organic farming "organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection".
- FAO suggested that "Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs".

Principle of organic Agriculture:

- The Principle of health
- The Principle of Ecology
- The Principle of Fairness
- The Principle of Care

Characteristics of Organic Farming:

- Protecting the long term fertility of soil by maintain organic matter levels, encouraging soil biological activity and careful mechanical intervention.
- Providing crop nutrients indirectly using relatively insoluble source which are made available to the plant by the action of soil micro –organisms
- Self- sufficient in nitrogen through use of legumes and biological nitrogen fixation and effective recycling of organics materials including crop residues and livestock manures.
- Weed disease and pest control by relying primarily on crop rotations, natural predators' diversity, organic manuring, resistant varieties, and limited thermal, biological and chemical intervention.
- Extensive management of livestock, paying full regards to their evolutionary adaptations, behaviour need and animal welfare issues with respect to nutrition, housing, health, breeding and rearing.
- Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.

Sustainable Agriculture and Organic Farming

- Sustainable agriculture integrates the main goal to sustain biodiversity enhance the quality of nature resources, economic profitability and social equity.
- Organic agriculture provides high nutrient food to human beings and animals for their wellbeing. Raising awareness, increasing market requirement, nurturing the attitude of the producer to become organic, increasing research and Government support has resulted into good development in organic agriculture

Components of Organic farming for sustainable agriculture development

- **Crop Rotation:** A technique of growing different crops in the same area according to the sessions to avoid pests and to maintain soil fertility.
- **Crop Residue:** there is a great potential for utilization of crop residues of some major crops. About 50 percent of the crop residues are utilised as animal fed, the rest could be very well utilized for recycling of nutrient

- **Using Green Manures:** Plant leaves and waste material of plants
- **Biology Pest Control:** Using living organization to protects plants from pests instead of synthetic chemicals
- **Vermicomposting:** A process of composting using different worms for preparation of compost w/the mix of kitchen waste and other vegetables waste. Retailing, packaging and labelling of organic products are also vital components in the promotion of organic products.

Some of the policy initiatives to promote organic farming and exports include

- Development of an organic regulation for exports by the Agricultural and Processed Food Products Export Development Authority (APEDA)
- Removal of quantitative restriction on organic food exports
- Providing subsidies to farmers under the Paramparagat Krishi Vikas Yojana (PKVY) in partnership with the state government
- Other schemes such as the Mission Organic Value Chain Development for North Eastern Region

Statics of organic farming in India

- Despite these initiatives, a recent survey-based study covering 418 organic farmers across different states of India suggests that a move to organic farming methods may not be that easy and organic farmers are not getting the expected premium price for their produce.

The study highlights five key issues faced by organic farmers that are affecting their livelihood and income –

1. The supply chain is underdeveloped and small and mid-sized farmers located in hilly regions and tribal belts find it extremely difficult to access the market.

- There is a shortage of pack houses and refrigerated vehicles, which leads to spoilage.
- Organic products have to be stored separately from conventional products to avoid cross-contamination and the existing supply chain does not often provide that facility.
- Companies mostly source from farmers in regions with a well-developed supply chain and only a few of them are sourcing from the Northeastern states and tribal belts, despite their high potential in organic farming.
- While the government is supporting organic product marketing through fairs and exhibitions, it does not give farmers a steady market. In a number of cases, the middlemen take away most of the profits and farmers are not able to earn a premium price. Direct linkages to processors and retailers could have helped farmers to get a better price, but farmers lack the right linkages and hence have to depend on middlemen and mandis.

2. While the government is subsidising farmers under the Participatory Guarantee System (PGS) for India, which is a self-certification process supported through the PKVY scheme, these farmers are not allowed to export.

- In fact, the APEDA has made it mandatory to have a third-party certification for exports. This is despite the fact that globally more than 100 countries, mostly developing countries, recognise the PGS.
- Unless farmers under PGS India are allowed to export, they cannot earn the premium price. Therefore, ideally, farmers should have the right to decide where they want to sell the product—domestic market and/or export market—and the government policy should support the same.

3. As a farmer converts his/her land from conventional chemical-based farming to organic farming, there is a risk of loss in yield due to the withdrawal of chemical inputs and high yielding varieties of seeds.

- A number of countries, such as the United Kingdom, have carefully design subsidies to compensate for the yield loss during the conversion period. However, in India, there is no such subsidy.
- Further, a majority of the government budget and subsidies are targeted towards chemical-based inputs and, in many states, less than 2% of the budget is allocated to organic farming. Given India's low rank is Sustainable Developmental Goals Index, it is important for the government to allocate more funding to organic farming and sustainable agriculture practices.
- In the case of organic, the cost of laboratory testing and third-party certification is high and subsidy can definitely help. A number of states, such as Gujarat, Karnataka and Sikkim, have already set up their third-party certification bodies. Other states may also do the same.

4. There is a serious shortage of good quality organic inputs, which increases the risk of loss of yield.

- The available organic fertilisers are much below the required quantity, and there are a number of spurious players in the market too. Similarly, there is a shortage of good quality organic seeds. Some inputs companies have taken initiatives to go for third party certification. However, there is need for a policy on input standardisation.
- Further, different varieties of crops are grown in different regions of the country, and they are faced with different issues related to pest infestation and soil quality.
- Hence, there is a need for more crop-specific and region-specific research and development (R&D) on organic inputs. Farmers need access to equipment such as netting and poly houses to protect their crops against insects. Fruit flies have led to destruction of crops such as oranges in the state of Sikkim. Here, we can learn from the government of Bhutan, which provides equipment at subsidised rates—and the same can be replicated by Indian government as well.

5. The biggest challenge faced by organic farmers is the lack of an organic policy for the domestic market and imports.

- In the absence of regulation on labelling standard for organic production and logo, it is not possible to distinguish an organic product from a conventional product. This has led to fraudulent practices and genuine players are not getting the premium, which the consumers of organic products are willing to pay.
- While the absence of a policy makes it difficult to punish fraudulent players, the government cannot enforce punishment on the basis of a voluntary certification process. Therefore, over 79% of the farmers opined that the certification process should be mandatory and the government should help farmers under PGS India to get the mandatory certification once their land is converted to organic.
- In fact, over 91% of survey participants pointed out that there should be a uniform logo for organic, which will help in product identification. The study further highlighted that if the right policy measures are taken, then organic farming is expected to grow at 20% in the next five years and the farmers will see a rise in their income.

What are the steps needed to be taken

- Organic farming should begin with training the most important people behind the big picture: the farmers.
- Farmers need to be informed about the latest technological and scientific developments in this area. Incorporating organic tools and techniques into their daily operations in an efficient and effective manner will require ongoing training.
- Farmers will need to be weaned off quick-fix chemical methods and reintroduced to our long lost indigenous knowledge. They need to be trained afresh on aspects such as soil building, pest management, inter-cropping, and compost and manure preparation.
- Agronomists must be deployed in the field to monitor the quality of produce and give timely advice to farmers.
- Certification programmes such as the Indian government's National Centre for Organic Farming (NCOF) and Participatory Guarantee Scheme (PGS) need to be made mandatory.

Biofertilizers and Green Manuring

- Biofertilizers and green manures are important pillars of organic farming that support higher yield and maintain soil health. Biofertilizers is a very cost–effective solution for providing nutrients to crop in a sustainable manner, unlike chemical fertilizers which are costly and need repeated application.
- Green manuring utilizes lean period between 2 main crops and improve soil fertility by providing fixed nitrogen and improving organic matter of the soil.

Biofertilizer

- Biofertilizers are products of beneficial microorganisms which increase agricultural production by way of nutrient supply especially nitrogen and phosphorus.
- Biofertilizers can fix atmospheric nitrogen for plant use and can mobilize unavailable phosphorous pool which can be used by plants.
- These biofertilizers are inexpensive, simple to use and have no problem of environmental pollution.
- Use of biofertilizers not only help in sustaining productivity and soil health but also in reducing subsidy burden on the government by reducing the consumption of chemical fertilizers.

Types of Biofertilizers:

- Concept of microbial inoculation started with legume Rhizobium first patented by Nobe and Hiltner in 1896.
- In development countries like USA, UK, France, Australia, Biofertilizers is restricted to Rhizobium, whereas in Brazil, China and India it has been diversified and a large number of bacteria, fungi and actinomycetes are included in this group.

Nitrogen-fixing Biofertilizers:

- Rhizobia
- Azotobacter
- Azospirillum
- Blue Green Algae (BGA)
- Phosphate, potassium and Zinc Solubilizing microorganisms
- Arbuscular Mycorrhizae (AM)
- Plant Growth Promoting Rhizobacteria (PGPR)
- Azolla

Carrier based formulations

- For bacterial biofertilizers the carrier may be peat , lignite , peatsoil , humus ,talc

Liquid formulation:

- Liquid formulation is prepared by maxing bacteria with additives, stabilizers and nutrient solution that support bacterial population for a longer period.

Benefits of liquid formulation

- They are easy to apply as they can be directly applied to seed.
- They can be stored for a longer period.
- They require smaller space for storage compared to carrier based formulations

Benefits of application of different Biofertilizers:

- Biofertilizers provide various nutrients to plants like N, P, K etc. either by fixing elemental form (N) or by solubilizing unavailable nutrients like P, K and Zinc. VAM (AM) fungi benefit plants by mobilizing nutrients from a larger root area.
- Azolla not only fixes N but also adds organic matter to soil. Biofertilizers not only provide nutrients to plants but also protect plants from plant diseases as they secrete many antibiotic compounds which suppress the growth of disease–causing pathogens.
- Besides providing nutrients and suppressing diseases, biofertilizers also secrete some plant growth promoting hormones like auxins and gibberellic acid which makes plant healthy.
- Many biofertilizers like VAM and PGPR also help plants in avoiding water stress by secreting some polysaccharide which helps in soil aggregation and conserving moisture for longer times.
- Once the biofertilizers are established in the filed after 2 - 3 year of continuous application, does of biofertilizers may be reduced

Constraints

Some of difficulties faced by government and extension agencies popularizing biofertilizers especially for organic farming are:

- Timely supply of cultures in remote corners of the country where organic agriculture is practiced
- Lack of knowledge of farmer regarding biofertilizers and proper measures taken by extension department in demonstrating benefit of inoculants farmers
- Though mechanisms exits under fertilizer control order to looks after quality control of biofertilizers, persons involved quality control are not versed with proper tools and techniques of handling biofertilizers sample.

Zero Budget Natural Farming: A model for the future

- Andhra Pradesh is the first state to implement a ZBNF policy.
- **Natural farming:** Subhash Palekar, an Indian agriculturist who practiced and wrote many books about Zero Budget Natural Farming, developed the ZBNF after his own efforts at chemical farming failed. He identified four aspects that are now integral to his process:

- Seeds treated with cow dung and urine.
- Soil rejuvenated with cow dung.
- Cow urine and other local materials to increase microbes.
- Cover crops, straw and other organic matter to retain soil moisture and build humus.
- Soil aeration for favourable soil conditions.

These methods are combined with natural insect management methods when required.

Benefits of ZBNF

In ZBNF, yields of various cash and food crops have been found to be significantly higher when compared with chemical farming.

- Input costs are near zero as no fertilizers and pesticides are used.
- Profits in most areas under ZBNF were from higher yield and lower inputs.
- Model ZBNF farms were able to withstand drought and flooding, which are big concerns with regard to climate change.
- The planting of multiple crops and border crops on the same field has provided varied income and nutrient sources.
- As a result of these changes, there is reduced use of water and electricity, improved health of farmers, flourishing of local ecosystems and biodiversity and no toxic chemical residues in the environment.
- The programme can have a positive effect on many of the sustainable development goals through improvements in soil, biodiversity, livelihoods, water, reduction in chemicals, climate resilience, health, women's empowerment and nutrition.

Different from organic farming:

- In early 2016, Sikkim was declared India's first fully organic State. But organic agriculture often involves addition of large amounts of manure, vermicompost and other materials that are required in bulk and need to be purchased. These turn out to be expensive for most small farm holders.

Model for other States:

- Over the years, Andhra Pradesh has supported and learned from its many effective civil society organisations such as the Watershed Support Services and Activities
- Network, Centre for Sustainable Agriculture and the Deccan Development Society.
- Farmer-to-farmer connections as vital to its success. Farmer's collectives such as

Farmer Producer Organisations need to be established and these would be critical to sustaining the programme.

- A step-by-step increase in the area covered. The scaling up relies primarily on farmers and local groups — all in all, very much a bottom-up process.
- The approach taken to monitor the improvements is vital to understanding the outcomes of large-scale changes that are under way; this is critical to expanding the

Women in Organic Farming – Agent of change

Areas of focus they deem necessary to promoting the role of women in global agriculture:

- Women need to occupy a greater number of agricultural research positions in order to enrich the available body of research with women's perspectives and self identified objectives.
- Women need more access to technical training. This includes training with far equipment, but also a re-examination of how institutions like the U.S.'s extension service support and train farmers.
- Women need access to capital funds for land and equipment, as well as financial support to purchase things like tools, seeds, and other farming inputs.
- Agriculture needs more policies that target a reduction of the gender gap in farming and farm earnings, and supporting action to ensure such policies work toward meaningful change.
- Agriculture needs to cultivate more women leaders, both to inspire a continued increase in women farmers and to steer action, research, and access in a direction that is supportive of and accessible to women.
- In some parts of the country, the tribal women prefer growing food crops rather than cash crops because their priority is to meet their family's nutritional requirements. They've formed groups bringing together landholders and the landless poor on the basis of equal sharing: patches of land are leased out for organic farming.

- In order to promote traditional organic farming, the government of India has created the Paramparik Krishi Vikash Yojana programme. Under the scheme, over 600 extra hectares of land will be farmed organically by 1370 farmers from 30 clusters of tribal hamlets starting from this monsoon crop season, which usually spans from June to October. In this way, tribal farmers especially farmers who are women, have set another example justifying the urge to shift from intensive to organic agriculture.
- It seems obvious, but maybe history just hasn't been paying attention: women make up half of the world's population, so sustainable economic growth (and all of the social and environmental benefits that stem from that) could be as easy as inviting more women to the conversation. In the words of former U.N. Secretary-General, Kofi Annon, "there is no tool for development more effective than the empowerment of women."

Changing Scenario of Organic Farming

Why Organic Farming?

Organic farming is basically farming without the use of chemicals. In India after Power sector Agriculture is the second highest emitter of greenhouse gases

a. Organic farming is totally environment friendly
b. Organic farming reduces the carbon emission by 40 to 60 percent compared to farming with chemical fertilisers and pesticides
c. Organic farming doesn't pollute the environment with chemicals hence it preserves the biodiversity of animal, plant , insects and micro – organism species
d. Conserves water and enhances moisture
e. Organic farming ensures sustainable soil health and reduces soil erosion
f. Organic farming reduces the use of non-renewable energy
g. Organic farming is a healthier option
h. Organic food taste better
i. Climate change risk management
j. Increased livelihood

Challenges of Organic Farming

a. Low crop yield during conversion
b. Inadequate quality standard
c. Policy support
d. Inadequate agriculture market support
e. Inadequate market research
f. Limited availability of organic food products
g. Lack of direct marketing
h. Use of recent technology needed to be promoted
i. Promotion of high value crop
j. Crop planning and diversity
k. Contract farming can emerges as an option to de-risk agriculture at various stages in the value chain
l. Collectivization of farmers
m. Promotion of input based enterprises
n. Agri – preneurs to provide market
o. Linking farmers to processors and exporters
p. Widespread extension

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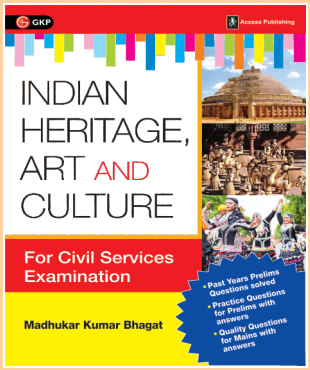

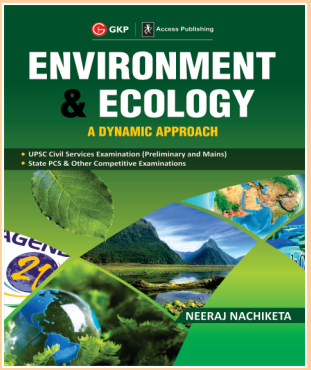

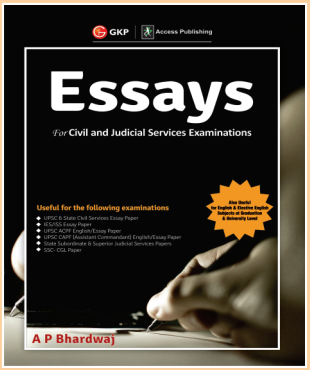

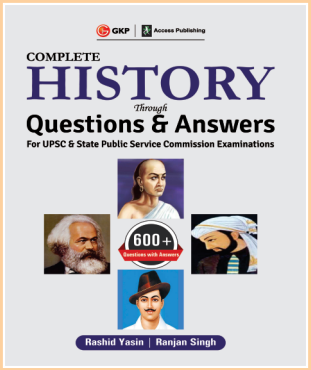

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