



Good Agricultural Practices (GAP)



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After Independence, the concentrated efforts of agriculture researchers and policy makers have helped to achieve green revolution in India. The country gained momentum in producing enough food grain for its survival and in the next 40 years, it has transformed from 'begging bowl' to "bread basket". Indian agriculture is growing fast and attaining higher benchmarks of food production. During 2017-18, the food grain production was estimated to be at 277.5 million tonnes (mt). Similarly, during 2017, horticulture production has reached to 306.8 mt with 97 mt and 179.69 mt of fruits and vegetables production, respectively. Among vegetables, potato alone contributes 49 mt of production. After attaining the state of self-sufficiency in food grain production, now the country can go a step ahead and work for quality and healthy food production. Potato is an important crop for ensuring food and nutritional security and hence will always remain a research priority.

The global market is witnessing an increasing demand for safe and quality food. The local as well as global consumers are getting serious about healthy, hygienic food and cautious about chemical residue in food and its consequences on health. Also, agriculture production is facing complex problems like climate change, increase in biotic and abiotic stresses, deterioration of natural resources, rising cost of cultivation etc. which has put forward many challenges to produce quality food. This changing scenario has led to the genesis of Good Agricultural Practices (GAP) with the objective to develop common standards and procedures for food production and marketing. The concept of GAP is based on fundamental principles of safe and quality food production, conservation of environment and natural resources, sustainable farming and economic and social sustainability. Food and Agriculture Organization (FAO) describe GAP as collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability.

GlobalGAP is the farm certification scheme to ensure hygienic and quality food production; it safeguards the farm worker's health, helps to conserve environment and farm biodiversity, targets farm waste management and its reuse and recycling. Record keeping of all on-farm and off-farm activities, traceability of the produce, complaint procedure etc. helps to maintain the food quality. Moreover, it helps the grower for better price realization in the new emerging market. In a nutshell, GlobalGAP farm certification warrants economic, social and environmental sustainability. This scheme has acquired global acknowledgement and it is the worldwide assured standard for farm production. In line with this international trend, Quality Council of India (QCI) has introduced IndGAP certification scheme for indian farming scenario.

IndGAP certification scheme

Quality Council of India (QCI) has launched IndGAP certification scheme in September,

2014 with the objective of production of safe and hygienic food at the Indian farms and providing the opportunity of farm certification to a local standard at low cost. IndGAP is inclusive of GlobalGAP standards, best practices, prevalent industry standards and related ISO standards and relevant guidelines. The IndGAP standards comprises of control points and compliance criteria as per national farming practices and regulatory requirements. The scheme is framed as per the growing need of quality and safe food in domestic and international market. It takes into account not only the large farms but also address the small and marginal farmers. The focus of IndGAP standards is to address hygienic and quality food production taking into consideration workers' health and safety, conservation of the environment and farm biodiversity, waste management and recycling etc. The IndGAP basic is meant for small or marginal farmers or for those who are interested to introduce quality farm production for fresh consumption or for processing. Whereas, IndGAP Premium is targeted for large farms or farmer's group interested to seek certification for their farm produce, either for fresh consumption or for processing purpose.

Advantages of IndGAP certification

- Enables farm produce to be globally accepted by following GlobalGAP norms.
- Ensures better price realization to the produce in domestic as well as international market.
- Secure and strengthen the livelihood of small and marginal farmers.
- Ensures safe, hygienic and quality food production.
- Create new market opportunities for farmers and exporters.
- Facilitates capturing new market advantages by modifying management in supply chain.
- Helps to safeguard the worker's health and safety at working places.
- Minimize wastage of natural resources.
- Creating trust among producers, suppliers, traders and consumers.

Scope of certification

- **IndGAP Basic:** This covers the basic requirement of Good Agricultural Practices and is applicable for all farming practices in sustainable manner for maintaining quality and food safety of agricultural produce. This standard covers control points and compliance criteria mainly for farms that are either small or marginal or the ones that aspire to introduce quality in their farms for the farm produce in fresh unprocessed form or for further processing.
- **IndGAP Premium:** It encompasses control points and compliance criteria for any farm wanting to be assessed for global standards for farm produce in fresh

unprocessed form or for further processing. The main components of this standards are all farm base module and crop-based module:

- a) Allfarmbasedmodule
- b) Crop based module
 - Fruits and Vegetables
 - Combinable crops
 - Tea
 - Green coffee

Key components of IndGAP


Site selection

- Risk assessment of new sites for vicinity to industries, brick kilns, toxic waste, heavy metals, industrial and urban effluents, river, canals, all possible contamination, land reclamation, irrigation water quality and drainage etc should be done. It helps in appropriate crop management.
- If irrigation is required, the farm should have access to reliable source of water.
- Risk management plan should be prepared to minimize all identified risks.
- Previous years' meteorological data should be considered for judging the suitability of the site for a particular crop production system.

Soil conditions/management

- Soil testing for precise nutrient application, soil amendments, site-specific nutrient.
- Physico-chemical analysis of soil, mapping of field's nutrient status to understand the suitability of the land for a particular crop and cropping system.
- Follow region specific recommended package of practices for cultivation.
- If the soil is prone to erosion, then adoption of soil conservation (cultural or mechanical) techniques is essential.

Seed material

- Grow most suitable variety recommended by central and state agencies as per region/agroecology.
 - Adopt recommended agro-technologies for the selected variety.
 - Quality of planting material viz., seed source, seed health, purity, seed treatment to be critically followed.
 - Keep all required records in compliance with national/ state legislation and GAP standards.
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Field management

- Precision in variety specific planting for optimum seed rate, planting depth and geometry, plant population etc.
- Practice of crop rotation.
- Keep record of previous years cropping sequences.
- Optimum soil tilth and judicious soil preparation.

Nutrient management

- Soil test based, variety specific and mandatorily integration of organic and inorganic sources.
- Ensure supply of micro-nutrient requirements of a crop.
- Organics, green manure and recycled material should be the first choice.
- Risk assessment of well treated/ composted material is necessary for disease transmission, weed seed dispersal and heavy metal content.
- The sources of organic manures, their nutrient content must be known.
- Farmyard manure, sheep/ poultry manure, oil cakes or slaughterhouse wastes must be fully decomposed prior to their application.
- Use of raw human sewage, municipal and industrial sludge is completely banned.
- Bio-fertilizer (specifically microbial) should only be applied after recommendation from technically competent source.
- Extra requirement of a crop should be met by judicious use of inorganic products only after utilization of organic sources. Their source and nutrient contents should also be known.

Water management

- Water quality should be tested and assured for its use in irrigation, post-harvest washing, treatment etc.
- Region and variety specific water requirement should be known and accordingly a plan can be prepared for judicious and efficient use of water.
- Risk assessment to be done for probable microbial, chemical and physical pollutants in irrigation water.
- Implement adequate measures to prevent the flow of contaminated water into fields.
- Proper drainage, water harvesting and conservation methods should be followed at farm site.

Weed management

- Adopt recommended, crop specific integrated weed control strategy.
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- Initial flush of weeds to be effectively controlled to ensure weed free environment for crop.
- Cultural (crop rotation, hot weather cultivation, green manuring, proper seedbed preparation, precise planting and placement of manures and fertilizers, mulching etc.) and mechanical (manual or mechanical inter-cultural operations) weed control measures to be prioritized.
- At last, use of only recommended herbicides with prescribed doses applied at right crop growth stage.

Disease and pest management

- Prepare a comprehensive crop protection plan.
- Follow recommended integrated pest and disease management practices.
- Cultural, bio-agents and biological control measures should be preferred.
- Use of chemicals should be restricted as a last resort with technical advice and recommendations.
- Only registered plant protection products recommended for specific crop should be used.
- Observe pre-harvest intervals for specific plant protection products.
- Do not repeat the spray schedule without any recommendations.
- When chemical pesticides are used, the residue analysis of final product should be carried out through certified laboratory.

Harvest and post-harvest management

- Physiological maturity period of the cultivated variety should be known and harvesting to be done accordingly.
- Harvesting, handling, packaging and storage must be done as recommended.
- Storage and packing space should be covered, ventilated, maintained clean and contamination free.
- Storage area must be kept free from animals and rodents and follow proper measures for their control.
- Follow pest control procedures for storage/ packing space.
- Different varieties must be stored separately with proper labels and signs to avoid their mixing.
- Method for sorting, washing, grading and drying should be well defined and equipment should be well synchronized and calibrated.
- Standards of grading, purity of produce must be strictly followed.
- Water used in washing should be of required standards and quality.
- Proper norms should be followed for packaging material, weight per packet,

handling of farm produce during temporary storage and container loading.

Storage of Agro-Inputs

- Fertilizers should always be stored in a separate, covered, clean, dry place and away from plant protection chemicals and farm produce.
- Similarly, agro-chemicals should be stored in separate, sound storage under cool, dry and secured condition away from farm produce.
- Storage space should be well protected from spillage, leakage and seepage to avoid surrounding contamination.
- Provide facilities for accurate measurement of chemicals.
- Mixing of chemicals can be done in storage facility.
- Spillage can be dealt with by equipping mixing area with containers of absorbent inert material like sand.
- Surplus mixture or tank washing should be disposed-off at designated fallow area in the farm.
- Empty containers of plant protection products can only be used for the same product at farm, otherwise safe mechanism is to be followed for their disposal.
- Similarly, expired chemicals should either be disposed-off by following proper procedure or securely maintained in storage.

Personnel

- Key resource person at farm (farmer and supervisor) must be familiar with all aspects of crop production.
- Workers should also have training on specific skills, hygiene and safety aspect.
- Persons responsible for plant protection measures at farm must have training for integrated pest and disease management.
- Workers must be provided with proper gears/ safety cloths during application of plant protection products for their personal safety and health.
- Train the supervisor and workers to maintain hygiene during handling, sorting, washing, grading and packing of produce.
- All workers should have proper knowledge and training for their respective work such as handling and application of chemicals and fertilizers, operating farm machines and equipment, health and safety measures, wearing of protective gear, clothing and shoes etc.
- Minimum one worker is to be trained in first aid assistance and must be present during all the farm operations.

Equipment

- All machinery used in fertilizer and chemicals application, harvesting and post-

harvest handling should be calibrated as prescribed by the manufacturers.

- Machinery and equipment should be in good condition and maintained at a regular time frame.
- Regular cleaning of equipment parts is important.
- The material (specifically metal) coming into direct contact should be of good quality to avoid any contamination. Equipment that pose a risk of hazardous metallic contamination to the harvested crop should be avoided.
- Records of their regular maintenance and calibration should be maintained.

Workers health, safety and welfare

- A farm should have a written risk assessment document for various operations which should be updated periodically.
- There should be a written policy on health, safety and hygiene. This will include risk assessment issues viz., accident, emergency, hygiene etc.
- Adequate precautions to be taken to prevent on farm accidents of farm equipment/machinery.
- A comprehensive procedure for handling emergency situations should be developed in local language and in pictorial format at farm. It should include farm and building map, farm address, contact person responsible for worker's welfare, nearest communication point of phone, important phone numbers (ambulance, hospital, fire brigade and police), emergency exits, location of fire extinguishers, emergency cut off for electricity, gas, water supply etc.
- Permanent warning signs should be prepared in readable ways to indicate hazardous sites such as fuel tank, plant protection storage, workshops, electricity control panel, disposal area for chemicals, etc.
- Electrical installations, plant protection storage, fuel tanks and risky equipment must have adequate safety measures.
- Provide designated areas and clean, hygienic facilities for hand washing, eating, and toilets etc.

Record keeping and internal inspection

- Maintain a minimum record of past two years or more from the date of the first/previous external inspection as advised by the certifying agency.
- Keep a record of all farm operations (ploughing, sowing, weeding etc.), fertilizers (stock, source, quantity applied and time of application etc.), irrigation schedule, weed control schedule, plant protection product (chemicals, doses and mode of application etc.) with exact dates of application.
- All the IPM measures, various approaches adopted for disease and pest management, chemicals including their storage, crop stages and quantity used

etc. should be recorded.

- Maintain a record of harvesting procedures, handling and storage, etc.
- Minimum one internal self-assessment per year to be taken against the required standards.


Traceability

- Each consignment of produce must be legibly marked with details of variety, month and year of harvest, name, address of grower etc., following trade practices/ legal requirements.
- Likewise, there should be documented identification and traceability system of produce so that produce can be traced back to registered farm including particular field and tracked forward to the immediate customer.

Waste and pollution management, recycling and reuse

- Identify and list all possible waste products and source of pollutants.
- Prepare a comprehensive, documented strategy after review of current practices for minimum wastage during production, recycling and re-use of waste.
- Disposal procedure for non-recyclable materials should exist at the farm.
- Facility should be developed for on farm organic waste composting.
- Farm and premises should be kept free of litter and waste.
- Farm must have separate identified areas for storing/ decomposing different types of litter and waste.

Environment and Conservation

- There must be a written action plan for improving habitats and to increase farm biodiversity.
 - A baseline survey of flora and fauna should be done and aftereffects on agriculture should be studied to improve the action plan.
 - Unproductive site (lowlands or unfertile soils) may be identified for conserving natural flora and fauna.
 - Fuel efficient farm machinery and equipment should be selected to minimize the use of non-renewable energy.
 - Renewable sources of energy like solar, wind etc., may be integrated in farm power supply plan.
 - Regular maintenance and servicing of equipment should be done for efficient energy consumption.
 - Maintain a record of all the activities for external audit.
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Complaints

- Complaint procedure must be in place and made available on request for GAP related issues. This should have an appropriate recorded follow-up action.
- A documented recall procedure for produce should be adopted and person responsible for taking decisions must be identified.
- Recall procedure must be speedy, transparent and accurate. For this, GlobalGAP traceability and recall standards may be followed.

Subsidy for this scheme

- Agriculture and Processed Food Export Promotion Scheme of Agriculture and Processed food products Export Development Authority (APEDA) for the Medium Term Expenditure Framework (2017-18 to 2019-20). (<http://apeda.gov.in/apedawebsite/Announcements/SchemeGuidelinesMTEF27042018.pdf>)
- Ministry of Agriculture for mission on Integrated Development of Horticulture has subsidized the IndGAP certification cost ([https://midh.gov.in/PDF/midh\(English\).pdf](https://midh.gov.in/PDF/midh(English).pdf)).

ICAR-CPRI has already compiled IndGAP Basic and IndGAP Premium protocols for potato production as per Quality Council of India's guidelines. The institute is working on technical compliance of GlobalGAP for export quality potato production. Interested entrepreneurs/potato growers can contact the Director, ICAR- Central Potato Research Institute, Shimla (email- director.cpri@icar.gov.in; directorcpri@gmail.com) and seek guidance on IndGAP as well as GlobalGAP compliance for domestic and export oriented potato production.

For further information, please visit following sites:

Quality Council of India: <http://qcin.org/india-good-agriculture-practices.php>

GlobalGAP: <https://www.globalgap.org>

ICAR-CPRI: <http://www.cpri.icar.gov.in>

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