



# IAS PARLIAMENT

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## GIST OF KURUKSHETRA

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*Agriculture for Prosperity*



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## **KURUKSHETRA - FEBRUARY 2018**

### **1. ORGANIC FARMING PRACTICES IN INDIA**

#### ***What is meant by Organic Farming?***

- Organic agriculture is a holistic production management system which promotes and enhances agro ecosystem health, including biodiversity, biological cycles and soil biological activity.
- It emphasizes the use of management practices in preference to the use of on farm inputs, taking in to account regional conditions locally adopted systems.

#### ***What are the benefits of organic farming?***

- Adoption of organic agriculture in India can bring greater economic benefits to farmers and environmental growth for the nation that emphasize on more sustainable production system crucial for achieving food security apart from maintaining natural resources.
- It sustains bio diversity, soil fertility and natural ecosystem processes and other services that underpin the agriculture.
- It allows the farmers to overcome the crop failures and increased cost of production, encourages production of healthy food and fibre of higher quality.

#### ***What are the categories of organic farmers in India?***

- The first category of organic farmers are those who are in "no input or low input" use zones, for them organics is a way of life and they practise as a tradition.
- The second category of farmers is those who have recently adopted the organics in the wake of ill effects of conventional agriculture.
- The third category comprise of farmers and entrepreneurs who have systematically adopted the commercial organic agriculture to capture the emerging market opportunities and premium prices.

#### ***What are the requirements and interventions in organic farming?***

- The soil for organic farming should be friable and must have the sufficient organic matter content with ideal pH content of 6.5 to 7.5 to help the microbial activity called as living soil.
- The non edible oil cakes like neem, pungam, mahua and castor have low carbon nitrogen ratio and applied as organic manures which can help in quick release of nutrients.
- Use of crop residues after decomposition is essential in organic crop production, which increases the



soil organic matter content, maintains soil fertility status of the soil.

- Leguminous crops like beans, peas, greengram, blackgram, soybean and cowpea are raised on a crop rotation basis with cereal crops to improve the soil fertility status of the soil.
- Vermicompost is a digested material of the organic wastes by earthworms, used as a quality manure in organic farming, recommended for basal as well as top dressing applications.
- Bio fertiliser like bluegreen algae, azolla, azetobacter and azospirillum can fix the atmospheric nitrogen to the root nodules of the plants.
- Certain fungi species like Vesiculararbuscular mycorrhiza is also used to improve the availability of phosphorous, zinc, copper and sulphur.
- Panchagavya, an organic product has the potential to play the role of promoting growth of the plant and promoting the immune system of the plant.
- Jeevamurtham is one of the cheapest source of nutrient supplement and it can be applied for the overall growth of the plants.
- The careful usage of water is advocated in the organic farming methodology because the over irrigation causes the salt deposition, dilution of nutrients also takes place apart from the waste of water.

- The stale seed bed technique is one of the important non - chemical weed management tactics followed in organic farming, in which field is irrigated once before sowing, after germination of weed seeds, it is ploughed down and incorporated.
- Agro forestry is one of the important component in organic farming as it provides green manures, fodder and act as pest repellent for most of the crops.
- Border cropping technique is one in which the taller and dense foilage producing crops like maize, sorghum around the primary crops like vegetables to restrict the movement of crops in the planted area.
- Timely earthing up, mulching with crop residues reduces the infestation of pest and diseases affecting stems at collar regions of the plant.

## **2. VALUE ADDITION THROUGH FOOD PROCESSING**

***What is food processing and its importance in India?***

- Food processing is the transformation of cooked ingredients, by physical or chemical means into food, or of food into other forms.
- Food processing combines raw food ingredients to produce marketable food products that can be easily prepared and served by the consumer.



- In the increasingly rising share of non agriculture activities of contemporary rural India, processing industries can play a vital role in achieving the objective of doubling the farmer's income.
- Diversification of diets, globalisation of diets, nuclear families juxtaposed with supply side factors like policy changing policy perspectives including digitisation and export opportunities propel growth of the economy and offers more employment and it will play a vital role in bringing people from poverty.

#### ***What are the challenges faced by the food processing industry in India in the Initial years?***

- The lack of innovation and research in this field hampered the progress of this sector as the age old technology doesn't give proper economic benefits.
- The processed foods was thought as the food of rich and this thought prevent the market share of the processed foods.
- The tax rates are also high and other multiple slabs made this sector as non viable investment for the entrepreneurs.
- Concept of cold chain was in the initial stages and not well penetrated in India until the late nineties and it hampered the growth of Dairy processing in the food processing.

- Standards and protocols were absent for the food safety and laws for food safety were absent until 2005.

#### ***What is the scenario of Food processing at present?***

- The consistent rise in the per capita incomes and shifting of incomes after 1981 to a higher growth path led to the rise in middle classes, who have the purchasing power to buy the processed foods.
- The GOI witnessing these changes, in order to promote this sector it formed the separate ministry to harness the complete potential of this sector.
- After the full scale liberalisation in 1991 this sector got the new impetus as several policy initiatives for freeing the licensing system, foreign investment., etc were taken during this time to promote this sector.
- The entire sector was deregulated and no license is required except in case of items reserved for small scale sector and alcoholic beverages.
- Automatic approval for foreign investment up to 100 percent equity in food processing industries is available except in few cases.

#### ***What are the recent initiatives of GOI to promote food processing sector?***

- Model Law on Contract Farming to be prepared and it will integrate backward integration of the food processors with the farmers and



attracting investment in post harvest management activities leading to increased benefit to the farmers and reduction in wastages.

- A Dairy Processing and Development Fund of Rs. 8000 core to be set up in NABARD, will be used to modernize old and obsolete milk processing units particularly in cooperative sector and will result in enhancing milk processing capacity thereby adding more value to the produce of the farmers and increasing their income.
- National Policy on Food Processing will provide a road map for holistic development for the food processing sector, the potential and opportunities for the growth of supply chain and promote food processing in the country to create employment opportunities and ensure wellness of the farmers.
- Ministry organized World Food India 2017 from 3rd to 5th November, 2017 in Delhi to showcase investment potential of India in the food processing sector and attract investment in the entire supply chain for inclusive development.
- The SAMPADA Scheme will target creation of Infrastructure and increasing capacities of processing and preservation in entire supply chain of food processing sector right from farm gate to retail outlets.

- Setting up of investment tracking and facilitation Desk of Invest India in the Ministry will identify new potential investors and approach them in a focused and structured manner for investment and follow-up the investment cases by providing hand holding services.

### **3. TECHNOLOGICAL INNOVATIONS FOR AGRICULTURE**

*What is the need for the technological innovation in agriculture?*

- The global population is projected to be nine billion by 2050 and considering the quantity of land to be same for feeding this huge population we need better technologies to conserve the resources and to provide food security at the same time.
- In the past, the emphasis was more on improving the yield but today the scenario has changed to improve the nutritional value of the foods and for this technological intervention is inevitable.
- Site specific nutritional and water requirement can be made possible in technological innovation and it will lead to the safeguarding of environment.

*What are the technological innovations possible for water management?*

- The adoption of deficient irrigation such as regulated deficit irrigation



and controlled late season deficit irrigation are becoming an accepted strategy for water conservation and to reduce the water used for crop production.

- The reduction in crop water demand can be done by promoting innovative techniques and uses such as conjunctive use of surface and groundwater, water saving crop production technologies, rationalisation of subsidising electricity for irrigation including system of pricing and incentives for groundwater usage.
- Pressurised irrigation system which includes both drip irrigation and sprinkler irrigation, proved to be an water efficient system in saving water and increase in water use efficiency.
- Drip irrigation along with supply of fertilizers which is called as fertigation, reduces the usage of chemical fertilizers and water and subsequently, optimises the nutrient use by applying them at proper place and time, which finally increases the water and nutrient use efficiency.
- The methodologies like zero tillage, bed planning, etc will improve the conservation of resources and efficient usage of water resources which conserves water resources from undue exploitation.

### ***What are the technological innovations in Nutrient Management?***

- Precision agriculture involves the integration of the modern technologies to allow farm producers to manage within field variability to maximize the benefit cost ratio.
- Variable rate technology available with farm implements, such as fertilizer applicators and yield monitors has evolved rapidly and has fostered the growth of precision agriculture.
- Leaf colour charts, chlorophyll meters and Green seeker based nitrogen management which ensures that nitrogen is applied at the right time and right amount needed by the crop plants which reduces the usage of N fertiliser.
- Application of NPK fertilisers is adjusted to the location and time specific as per the needs of the plant reduces the environment degradation.
- Optimal usage of on farm nutrient input sources such as crop residues will have a great bearing on the reduced usage of the chemical fertilizers.
- Use of Nitrogen omission plots techniques to ensure that phosphorous and potassium is applied in the ratio that is required by the plants.
- Local randomisation for fertiliser application of zinc, sulphur and micronutrients are followed.



- Integration with other integrated crop management practices such as use of quality seeds, optimum plant population, IPM practices and efficient water management.
- Use of software based tools like Nutrient Experts, Crop Manager, Geographical Information System and Global Positioning System in monitoring application of nutrient will aid better and optimised results.

#### ***What are the other technological innovations for agriculture?***

- Conservation Agriculture (CA) is a set of soil management practices that minimize the disruption of the soil's structure, composition and natural biodiversity. CA has proven potential to improve crop yields, while improving the long-term environmental and financial sustainability of farming.
- Climate Smart Agriculture is a method of agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals.
- Integrated crop management. Integrated crop management (ICM) is a holistic approach to sustainable agriculture. It considers the situation across the whole farm, including socio-economic and environmental

factors, to deliver the most suitable and safe approach for long-term benefit

#### **4. INTEGRATED FARMING SYSTEMS: A NEW APPROACH**

##### ***What is Integrated farming system?***

A judicious mix of agricultural enterprises like dairy, poultry, piggery, fishery, sericulture etc. suited to the given agro-climatic conditions and socio-economic status of the farmers can be termed as Integrated Farming practice.

##### ***What are the essential components of IFS?***

- Enrichment of soil : need based use of chemicals, use of crop residue as mulch, use of organic and biological fertilizers, adopt crop rotation and multiple cropping, avoid excessive tillage and keeping the soil covered with green cover or biological mulch.
- Management of temperature : keep soil covered, plant trees, orchards and bushes on bund.
- Conservation of soil and water : Create percolation tanks, maintain contour bunds in sloppy land and adopt contour row cultivation, Create farm ponds, maintain low height plantation on the bunds.
- Harvesting of sun's energy : maintain green stand throughout the year through combination of different cropping systems and other plantations.





- Self reliance in inputs : Develop own seed to the maximum extend, on farm production of compost, vermicompost, vermiwash, liquid manures and botanical extracts.
- Maintenance of life forms : Develop habitat for sustenance of life forms, minimal use of permitted chemicals and create enough diversity.
- Integration of Animals : Animals are important components of farm management and not only provide animal products but also provide enough dung and urine for use in soil.
- Use of renewable energy : Use solar energy, bio gas and other eco friendly machines.
- Recycling : On Farm recycling of wastes as input to other enterprises.
- Meeting the basic needs of the family : Create and integrate components for meeting the family needs such as food, fodder, feed, fibre, fuel and fretilizer to maximum investment within the farm boundaries in a sustainable manner.
- Round the year income for meeting social needs : Create marketable surplus and integrate allied activities such as bee keeping, value addition ., etc to get the year round income for the family to meet social needs such as education and family functions besides health.
- Higher food production to equate the demand of the exploding population of our nation.
- Increased farm income through proper residue recycling and allied components.
- Sustainable soil fertility and productivity through organic waste recycling.
- Integration of allied activities will result in the availability of nutritious food enriched with protein, carbohydrate, fat, minerals and vitamins.
- Integrated farming will help in environmental protection through effective recycling of waste from animal activities like piggery, poultry and pigeon rearing.
- Reduced production cost of components through input recycling from the byproducts of allied enterprises.
- Regular stable income through the products like egg, milk, mushroom, vegetables, honey and silkworm cocoons from the linked activities in integrated farming.
- Inclusion of biogas & agro forestry in integrated farming system will solve the prognosticated energy crisis.
- Cultivation of fodder crops as intercropping and as border cropping will result in the availability of adequate nutritious fodder for animal

***What are the advantages of IFS?***



components like milch cow, goat / sheep, pig and rabbit.

- Firewood and construction wood requirements could be met from the agroforestry system without affecting the natural forest.
- Avoidance of soil loss through erosion by agro-forestry and proper cultivation of each part of land by integrated farming.
- Generation of regular employment for the farm family members of small and marginal farmers.

## 5. PRESERVING SOIL HEALTH FOR SUSTAINABLE PRODUCTION

### What is Healthy soil?

- A soil that is able to optimally sustain its native/acquired productivity potential and render ecological services is said to be in good health.
- A healthy soil has the following characteristics :
  1. It has good soil tilt, i.e. crumbly, well structured, dark with good amount of organic matter and possesses no hard pans.
  2. It has sufficient depth through which roots can grow to find water and available nutrients.
  3. It has good water storage and good drainage capabilities, e.g. it retains more water, but will also allow excess water to drain out from soil in case of heavy rain.

4. It has sufficient nutrient supply, but not imbalanced or excess of nutrients to achieve optimal production and also for balanced cycling of nutrients within the ecosystem.
5. It should contain abundant population of beneficial organisms that help in cycling of nutrients, decomposition of organic matter, maintenance of soil structure, biologically suppressing plant pests, etc.
6. It should be free of potentially harmful chemicals and toxins.

### What are the causes of soil deterioration?

- **Population pressure** - Due to high population, the soils have to be exploited beyond carrying capacity to feed the proliferating humans and also for production of clothing material.
- In many cases, the fertile lands are also used to build houses, roads and other infrastructures.
- Typically, in developing countries like India where the population pressure is high and proportion of nutrient stress free soils is low native fertility is being mined more than it is being renewed causing impaired soil health.
- **Decline in forest and tree cover** - Forest and tree cover prevent erosion, helps in soaking of precipitation/ rainfall and building the soil fertility.



- Therefore, the decline in forest and tree cover is leading to erosion of fertile soil layer, which causes loss of soil productivity.
- **Intensive soil farming** - Intensive (cropping system requires exhaustive tillage which breaks down soil organic carbon (SOC) to carbon dioxide and removes plant cover; this exposes the organic rich top soil to erosion by wind or water.
- Diminished level of SOC adversely affects soil physical condition and fertility.
- Indiscriminate and imbalanced use of chemical fertilizers and falling use of organic manures further hastens the processes of soil quality degradation.
- **Mounting use of pesticides** - Intensification of agriculture is resulting in indiscriminate use of pesticide.
- These pesticides persist in the soil and residues influence the natural nutrient cycles due to deadening effect on soil organisms.
- Decline in soil organisms results in decreased organic matter dynamics, soil fertility and maintenance of air and food quality.
- It also improves nutrient use efficiency, improves water quality and conserves soil water.
- **No tillage/Minimum soil disturbance** - As too much ploughing helps in nutrient loss and causes soil erosion, no or minimum tillage is used for growing crops without disturbing the soil.
- It conserves water and improves water use efficiency and increases soil organic matter and reduces soil erosion.
- **Residue retention/incorporation** - Applying plant residues to the soil surface to compensate for loss of residue due to excessive tillage.
- It increases soil organic matter, moderates soil temperature, conserves soil moisture and reduces erosion from soil and wind.
- **Soil-test-based fertilizer recommendation** - It reduce the overuse of fertilizers and increases the fertilizer use efficiency.
- The right amount of fertilizer is calculated based on the soil test values and then it is applied in the right form.
- **Application of bio fertilizers** - It helps in nitrogen fixing, phosphate solubilizing and mobilizing microbes or the microbial consortium to the crop plants has beneficial effect on crop growth, yield and soil fertility and sustainability in natural soil ecosystem.

### ***What are the strategies for Soil Health Management ?***

- **Diversified crop rotations** - Use of different crops in crop rotations, particularly cereal-pulses system increases soil organic matter, nutrients and biodiversity in the soil.



## **6. NATIONAL AGRICULTURAL MARKET : ONE INDIA, ONE MARKET**

### **What is eNAM ?**

- National Agriculture Market (NAM) is a pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities.
- The NAM Portal provides a single window service for all APMC related information and services.

### **What are the objectives of the this scheme ?**

The main objectives are-

- to integrate markets first at the level of the States and eventually across the country through a common online market platform, to facilitate pan - India trade in agricultural commodities;
- to streamline marketing / transaction procedures and make them uniform across all markets to promote efficient functioning of the markets;
- to promote better marketing opportunities for farmers / sellers through online access to more buyers / markets, removal of information asymmetry between farmer and trader, better and real-time price discovery based on actual demand and supply of agricultural commodities, transparency in auction process, prices commensurate with quality of produce, online payment

etc. that contribute to marketing efficiency;

- to establish quality assaying systems for quality assurance to promote informed bidding by buyers; and
- to promote stable prices and availability of quality produce to consumers.

### **What are the components of eNAM ?**

- A national e-market platform for transparent sale transactions and price discovery initially in regulated markets. Willing States to accordingly enact suitable provisions in their APMC Act for promotion of e-trading by their State Agricultural Marketing Board/APMC.
- Liberal licensing of traders / buyers and commission agents by State authorities without any pre-condition of physical presence or possession of shop /premises in the market yard.
- One license for a trader valid across all markets in the State.
- Harmonisation of quality standards of agricultural produce and provision for assaying (quality testing) infrastructure in every market to enable informed bidding by buyers.
- Single point levy of market fees, i.e on the first wholesale purchase from the farmer.
- Provision of Soil Testing Laboratories in/ or near the selected mandi to facilitate visiting farmers to access this facility in the mandi itself.



### **What are the challenges faced by eNAM?**

- Non uniform quality standards across various states especially in case of Horticulture produce is a hindrance in promotion of inter mandi and interstate trade.
- States are required to establish appropriate quality testing facilities equipped with the trained man power and suitable assaying equipments and states are falling short of this goal.
- Lack of skilled manpower to assist in the laboratories is another an hindrance to the effective functioning of this scheme.
- Lack of awareness and education among the farmers which make them to depend upon the middle men is another challenge.
- Digital illiteracy among the crop producers makes them as prey to the middle men or traders and they continue to exploit them.
- In order to promote the intermandi state trade unified trade licensing is a must. But till date only few states have established the facility for the provision of these unified licenses.
- Online payment directly to the farmer's bank account by the buyers is another area of concern where the progress is quite slow.

### **7. EVERGREEN REVOLUTION**

#### **What is the origin of evergreen revolution?**

- The concept of evergreen revolution is, indeed, a sequel to the green revolution of the 1960's which made the country self sufficient in food grains and ended its precarious dependence on the food aid and grain imports.
- Triggered by the usage of high yielding variety crops which require liberal use of water, fertilizers and plant protection chemicals, this revolution did not prove an unmixed blessing.
- It also caused some distortions in the cropping pattern and led to some unwarranted ecological ramifications in terms of degradation of natural resources like soil and water and emergence of new pests, diseases and weeds.
- So Shri M.S Swaminathan warned against the indiscriminate usage of the inputs for achieving the goals of green revolution and at the same time he proposed the concept of the evergreen revolution.
- Swaminathan's recipe for the evergreen revolution boils down to perpetuating the increase in land and crop productivity without causing any ecological harm.
- So at present GOI initiated many programmes and chalked out a working plan to convert the green revolution to the evergreen revolution.



***What are the priority areas to be focused for achieving evergreen revolution as proposed by NITI AAYOG?***

- **Productivity** : The present average productivity, despite remarkable spurt since the Green revolution, compares poorly with that in many other countries.
- Besides, there are also large regional variations in the crop yields within the country.
- Bridging these gaps can go a long way in laying the foundation of the evergreen revolution.
- This requires development of new cost effective technology and transferring it to the poor farmers besides empowering them financially to put this into practice.
- **Remunerative Prices** : Most farmers at present do not get remunerative prices for the crops due to the limited reach of the minimum support prices (MSPs) mechanism across the farm community in different parts of the country.
- The procurement based market intervention to provide price support has remained confined to a few crops - notably wheat, rice and, occasionally, some other crops - and in a handful of states, though this system has been in operation since the mid 1960s.
- Elsewhere, the existing agricultural marketing network is highly inadequate, besides being inefficient and non transparent.
- It manages to deliver only a small fraction of the final price to the actual producers.
- The huge gap between the prices received by the growers and those paid by the consumers bears this out.
- Clearly, a sizable chunk of the money spent by the customers is cornered by the large number of intermediaries in the marketing chain.
- **Size of Holdings** : The size of the farm holdings of the majority of agricultural households has shrunk to unviable level, nudging farmers to leave farming and look for jobs elsewhere.
- Over 85 per cent of the farm holdings are smaller than 15 hectares in size and many of them are economically unviable.
- Since the currently prevalent land leasing systems lack legal sanctity in most states and the land owners find it risky to lease land to others for tilling, large chunks of productive land is being left uncultivated.
- So an urgent need in the amendment of laws are need of the hour to promote the green revolution in to an evergreen revolution.
- **Relief Measures** : The present measures for relief and loss reimbursement to the farmers at the time of natural disasters are



inadequate and suffer from procedural inefficiencies and delays.

- The risk adaptation measures, too, are poorly executed and have not worked effectively. This situation needs to be rectified.
- **Agri potential of North East region :** The NE region has unique agro-climatic conditions for the production of several products.
- This potential needs to be optimally tapped. This would, of course, require institutional support and investment in technology innovations besides creation of supportive infrastructure of rural connectivity, transportation, storage and marketing.

## **8. PRADHAN MANTRI KRISHI SINCHAYEE YOIANA (PMKSY)**

### **What are the major objectives of PMKSY?**

The major objective of PMKSY is to

- achieve convergence of investments in irrigation at the field level,
- expand cultivable area under assured irrigation,
- improve on-farm water use efficiency to reduce wastage of water,
- enhance the adoption of precision-irrigation and other water saving technologies (More crop per drop),
- enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated

municipal waste water for peri-urban agriculture

- attract greater private investment in precision irrigation system.

### **What are the components of PMKSY ?**

- **Accelerated Irrigation Benefit Programme (AIBP):** To focus on faster completion of ongoing Major and Medium Irrigation including National Projects.
- **Har Khet Ko Pani (HKKP):** Creation of new water sources through minor irrigation (both surface and ground water); repair, restoration & renovation of traditional water bodies; command area development; strengthening and creation of distribution network from sources to the farm etc.
- **Per Drop More Crop (PDMC):** Precision irrigation systems, efficient water conveyance & application, micro level storage structures, topping up of input cost beyond Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) permissible limits, secondary storage, water lifting devices, extension activities, coordination & management etc..
- **Watershed Development (WD):** Ridge area treatment, drainage line treatment, soil and moisture conservation, rainwater harvesting and other watershed interventions.



### **What are the benefits of Micro Irrigation (MI)?**

- The irrigated area has increased in all the surveyed states after the introduction of PMKSY Scheme. Maharashtra has topped the list with 22.28% growth in irrigated area followed by Chhattisgarh.
- Farmers of all the states have shown an increase in area under horticulture crops after the adoption of the micro irrigation systems.
- Scheme has performed well in terms of reduction in input cost and significant cost saving has been observed for irrigation in all the surveyed states. Irrigation cost is reduced by 20% - 50% with average of 32.3%.
- Reduction in electricity consumption after installation of MI system. Average electricity consumption has been reduced by about 31% after using the micro irrigation system.
- Saving of fertilizers with averages reduction of about 28% in total fertilizer consumption in the surveyed states. Fertilizer saving vary from 7%-42% .
- Micro irrigation has generated benefits to the farmers in terms of enhancement of the productivity. The average productivity of fruits and vegetables has increased about 42.3% and 52.8%, respectively mainly because of crop spacing, judicious use of water and other inputs etc.
- The overall benefits accrued from the micro irrigation system are reflected in the income enhancement of the farmers. All the surveyed states reported increase in farmer's income in the range of 20% to 68% with an average increase of 48.5%.
- Benefit Cost (BC) ratio of installing micro irrigation system is greater than "1" across the states and across the crops, which signifies the importance of MI system in net income enhancement of the farmers.
- The positive outcomes have made the food security effective due to the increase in the production and productivity of different crops and increased area under irrigation from same source of water.

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