Organic food and human health

Elective Course: MSc (Bot), Sem-2, Paper-2
(Plant Resources)

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What is organic food?

Organic food is a product of a farming system that uses natural and regenerative processes:

- crop rotation;
- animal and plant manuring;
- mechanical weeding;
- biological pest control.

It refrains from the use of any toxic chemicals.

Organic animal feed and welfare standards are important.

In organic farming:

NO:

- artificial fertilizers
- synthetic pesticides
- GMO
- growth regulators
- artificial feed additives
- antibiotics are not preventively used on animals

Animal welfare

- Spacious and comfortable environment;
- Access to open environment;
- Quality feed such as grass pastures for livestock;
- Relief from mental stress caused due to electric fence etc

Why organic?

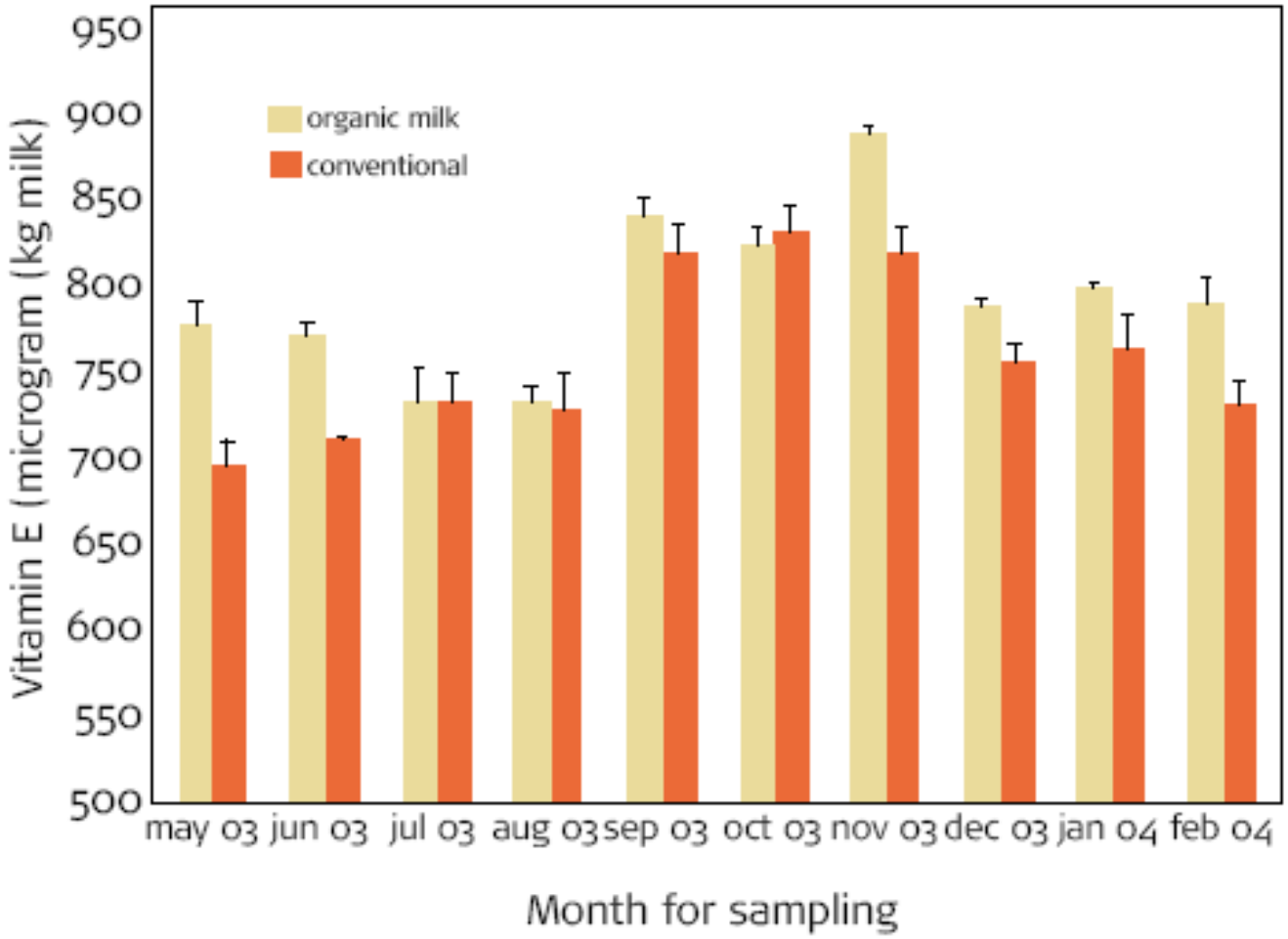
The mission of agriculture is not only to produce enough food, but also to take account the effects to the:

- environment;
- human health;
- animal welfare;
- social and regional development.

Benefits

- Positive effect to biodiversity;
- Fewer contaminants (such as pesticides, antibiotics and nitrates);
- Scientific studies have shown, there are more vitamins and minerals in organically produced food:
  - In organic milk, more antioxidants, 50% more of vitamin E, beta-carotene.

Vitamin E content in Organic & conventional: an example in comaparison



Problems of intensive farming

- Pesticide residues in products, soil, water;
- Fertilizers (**eutrophication-** the enrichment of a water body with nutrients, usually with an excess amount of nutrients);
- Loss of biodiversity- kills both harmful and beneficial organisms, destroys habitations of species;
- Degradation of soils (erosion);
- Landscape changes.

Pesticides

- Every year in EU, around 2,00,000 tonnes of pesticides are taken to the environment.
- In last 10 years, the amounts have doubled.
- Most of the pesticides in the top 10 of residues in EU have been declared **dangerous to human health** by WHO.
- In many cases, they are dangerous both to health and environment (including water, soil, air pollution, negative impact to birds, bees, fish, instects etc).

Pesticides

- Possible effects: poisonings, allergies, headache, impact on fetus, genetic changes, negative impacts on hormonal system and reproductive organs.
- The co-effects of pesticides are unknown, due to coctail-effect the effect of many pesticides could double or triple.
- Pesticide residues with certain molecule mass can accumulate in liver, bones, fat tissue.
- New pesticides are being taken to use all the time, while the old ones still remain in the environment.

Pesticides

- In African countries, a study shows;

Different pesticide residues, in fruits:

  - Grapes – 8 different residues
  - Orange, tangerine, paprika, pear, tea – 7 different residues
  - Lemon, peach – 6 different residues
  - Most of the residues are found in the peel
  - Orange, kiwi, tea, peach – level of pesticide residues more than allowed

- Similarly, in UK, apples were recorded 16 times spray, with 36 different pesticide (Heaton, 20015).

Critics of comparisons

- Food is complex topic
- In order to compare, the food has to come from similar conditions.
- Small differences in the level of vitamins might not have considerable impact to health.
- The amount of nutriens in food are influenced also by other things besides way of farming.

Food and sustainability

- **Sustainable food?**

- food, that is healthy both to Earth and everyone living on it (Sustainable Food Guide):
  - Local economy
  - Protection of ecosystems
  - Quality and healthy food

- **Principles**:
  - Local food instead of imported
  - More vegan products than animal products
  - Certified organic food
  - Fair trade products
  - Minimal packageing or reusable packages
  - Health food.

Determinants of Risk

- Quantity and number of pesticides applied
- Toxicity of the particular pesticide(s) used
- Amount of given food consumed
- Weight of the child (determines concentration)
- Potential for synergy between multiple compounds
- Type of food (meat, dairy, fruit) and origin

Common Toxic Effects

- Nervous System
- Carcinogenesis
- Endocrine
- Absorption/Exposure Sites (Skin, Eyes, Resp)

A (rational) approach to pesticide toxicity

- Pesticides are designed to disrupt the growth of fungi, weeds, insects, etc.
- These substances are obviously toxic to humans in large doses (e.g. accidental exposure)
- The issue here is chronic, low (?) dose exposure over a prolonged period and in vulnerable groups (i.e. children – smaller body weight, developing organs)

A (rational) approach to pesticide toxicity

- "Safe" limits have been established by food regulatory agencies
- These limits are established in a variety of ways
- Nevertheless, sampling and extrapolation have demonstrated that these limits are at times exceeded
- Must also consider methodology, outcomes, association vs. causation, confounding variables, research ethics

Some of the Experimental facts…

- According to the several animal studies, rats fed with the organically composed diet showed different physiological indicators compared to the conventionally fed animals.
- One indicator was that **lymphocyte proliferation** was significantly higher in rats fed with the organic vs conventional diet.
- Another study proved that chicken given organic were smaller but their **immune system was stronger** than the conventionally fed chicken.
- In addition, after infection, organic chickens started to **recover quicker** and were performing better than animals fed in a conventional way.

THE 2016 DIRTY DOZEN LIST

Environmental Working Group used USDA pesticide testing data to create this list of the most common fruits & veggies contaminated with pesticides.

NEARLY 75% OF PRODUCE SAMPLES TESTED CONTAINED PESTICIDE RESIDUES

This pesticide residues remained on the produce after washing and sometimes even peeling the produce.

THE REPORT UNDERSCORES THE IMPORTANCE OF CHOOSING ORGANIC.

Source: Environmental Working Group (EWG), 2016

The "Dirty Dozen"

(most pesticide-contaminated produce items are)

Environmental Working Group (EWG), 2016

- Strawberries
- Apples
- Nectarines
- Peaches
- Celery
- Grapes

The “Dirty Dozen”

- Cherries
- Spinach
- Tomatoes
- Sweet bell peppers
- Cherry
- Cucumbers


1
STRAWBERRIES
2
APPLES
3
NECTARINES
4
PEACHES
5
CELERY
6
GRAPES
7
CHERRIES
8
SPINACH
9
TOMATOES
10
SWEET BELL PEPPERS
11
CHERRY TOMATOES
12
CUCUMBERS

The "Cleanest" Dozen

- Avocado
- Asparagus
- Banana
- Broccoli
- Cauliflower
- Sweet Corn
- Mango
- Kiwi
- Onion
- Papaya
- Pineapple
- Sweet Pea

Source: Environmental Working Group, 2017

Nutritional Quality of Organic Foods

- Initial studies were small-scale with few measurements
- More longer-term and thorough work has added to the growing body of literature to suggest that organic foods are more "nutritionally dense" than their conventional counterparts
- Still limited to several key vitamins, minerals and other antioxidants; however, consistency of results is improving
- Questions regarding control of confounding variables

Why do most physicians not routinely endorse organic foods?

- Limited nutrition training during medical school
- Limited time; focus on more conventional/significant risk factor modification
- Priority is to ensure adequate consumption of macro- and micronutrients; “quality” may be of lesser concern
- Lack of familiarity with current evidence supporting organic food

Summary

- For several reasons, organic food is not routinely endorsed by physicians nor widely accepted by patients
- This situation exists despite theoretical and demonstrated pesticide accumulation, toxic effects, and poorer nutritional profiles from conventional food
- Children are at greatest risk but conversely may derive greatest benefit from consuming organic foods
- Current evidence, although far from complete, favours organic food more so than ever before

- The toxic effects from pesticide exposures suggests that early-life exposures are of greatest concern, especially prenatal exposures that may harm the brain development.
- Many pesticides are designed to be toxic to the nervous system, but living creatures depend on similar neurochemical processes.
- At least 100 different pesticides have caused adverse neurological effects in adults, and they are therefore suspected of being capable of causing damage also to developing brains.

Today, Oncologists from the Harvard Medical School recommend to cancer patients to:

- Change lifestyle
- Become vegetarians or avoid red meat
- Eat lots of organic food
- Avoid eating at FAST FOOD Restaurant like McDonalds

How to recognise?

(International brand)

How to recognise?

(National brand)

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accredit-ation	Certification Mark
1	**Bureau Veritas Certification India (BVCI) Pvt. Ltd., Mumbai**	**Contact Person:** Mr. R. K. Sharma Director **Address:** Marwah Centre, 6th Floor Opp. Ansa Industrial Estate Krishanlal Marwah Marg Off Saki-Vihar Road Andheri (East), Mumbai-400 072 (Maharashtra) Tel No: 022-66956300, 56956311 Fax No. 022-66956302 / 10 Email: scsinfo@in.bureauveritas.com	NPOP/NAB/001	31-05-2016	NPOP USDA NOP	Organic Farming BUREAU VERITAS Certification
2	**ECOCERT India Pvt. Ltd., Aurangabad**	**Contact Person:** Mr. Anil Jadhav Chief Executive Officer **Address:** Bungalow No. 21A, Shrirang City, Itkheda Behind Ryan International School, Paithan Road, Auranagabad Maharashtra 431 005 Email: office.india@ecocert.in Mob: 9552533011, 9552533017, 9552533009	NPOP/NAB/002	22-08-2014	NPOP USDA NOP	ECO CERT

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3	**IMO Control Pvt. Ltd.**	**Contact Person:** Mr. Umesh Chandrasekhar Director **Address:** No. 3627, 1st Floor, 7th Cross, 13th 'G' Main, H.A.L. 2nd Stage, Bangalore-560 008. Tel No: +91-80-25285883, 25201546, 25215780 Fax: 0091-80-25272185 Email: imoind@vsnl.com Web: www.imo.ch	NPOP/NAB/003	28-09-2016	NPOP USDA NOP	
4	**Indian Organic Certification Agency (INDOCERT)**	**Contact Person:** Mr. Mathew Sebastian Executive Director **Address:** Thottumugham P.O. Aluva-683 105, Cochin (Kerala) Telefax: 0484-2630908-09/2620943 Email: info@indocert.org	NPOP/NAB/004	24-10-2014	NPOP USDA NOP	
5	**Lacon Quality Certification Pvt. Ltd., Thiruvalla (Kerala)**	**Contact Person:** Mr. Bobby Issac Director **Address:** Chenathra, Theepany, Thiruvalla - 689 101 (Kerala) Tel No: 0469 2606447 Fax: 0469 2631902 Email: info@laconindia.com Web: www.laconindia.com	NPOP/NAB/006	31-10-2014	NPOP USDA NOP	

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6	**OneCert Asia Agri Certification (P) Ltd**	**Contact Person:** Mr. Sandeep Bhargava Chief Executive Officer **Address:** H-08, Mansarovar Industrial Area, Mansarovar Jaipur-302020, Rajasthan Phone & Fax- 0141-2395481,6541882, 6541883(Direct) Email:- info@onecertasia.in Web site:- www.onecertasia.in	NPOP/NAB/008	26-10-2015	NPOP USDA NOP	
7	**SGS India Pvt. Ltd.**	**Contact Person:** Mr. Amresh Pandey Technical Manager -Organic Certification **Address:** SGS India Pvt Ltd 226,Udyog Vihar, Phase-I Gurgaon-122016 Haryana Tel: + 91 124 6776300 Ext 6379 91 124 6776379 (Direct) Fax: +911246776403/04 Mobile: + 91 9871794709 Email: amresh.pandey@sgs.com	NPOP/NAB/009	01- 05-2014	NPOP USDA NOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accredit-ation	Certification Mark
8	**Control Union Certifications, Mumbai**	**Contact Person:** Mr. Dirk Teichert Managing Director **Address:** Plot No. C-113, Pawane MIDC, Navi Mumbai - 400709 Tel: +91-22-61294200 +91-22-61294300 Fax:+91-22-61294217 Mobile:09930453754 Email: cuc@controlunion.in cucindia@controlunion.com controlunion@vsnl.com Website: www.controlunion.com	NPOP/NAB/0010	28-05-2014	NPOP USDA NOP	CONTROLUNION (*w.e.f: 01-07-2013*)
9	**Uttarakhand State Organic Certification Agency (USOCA)**	**Contact Person:** Ms. Damayanti Rawat Director **Address:** Third Floor, Krishak Bhavan Mussoorie By Pass Ring Road Nehru Gram, Dehradun, Uttarakhand Tel : 0135 2671734 Email: info@usoca.org Website: www.usoca.org	NPOP/NAB/0011	13-11-2015	NPOP USDA NOP	USOCA NPOP/NAB/0011
10	**APOF Organic Certification Agency (AOCA)**	**Contact Person :** Mr. Suresh K.T Chief Operating Officer **Address:** 126, 1st Floor, Govindappa Road, Off D.V.G. Road, Gandhi Bazar, Bangalore-560 004 (Karnataka) Tel: +91-80-26677275, +91-80-41203848 Mobile: 09342349255 / 08880333255 Email: aocabangalore@yahoo.co.in Website: www.aoca.in	NPOP/NAB/0012	09-01-2016	NPOP	aoca

Certificate

Certificate number.....

Company's Name
Company's Address

Accreditation No. under NPOP
NPOP/NAB/xxxx

This is to certify that the product(s) and areas(s) of the mentioned organisation inspected by ..... are in accordance with requirements of

India´s National Programme for Organic Production standards
(considered equivalent to Council Regulation (EC) No. 834/2007 and Swiss Organic Farming Ordinance for plant products originating in India

For the following process, this
Scope of Certification
is issued.

This certificate is valid from
dd/mm/yy until dd/mm/yy

This certificate is valid for those product(s) and area(s) that are specified in the annexe.

The validity of this certificate solely depends on the continued compliance with the required standards and is subject to annual surveliance inspections.

Authorised by:

Organic Certification Manager

QUESTIONS WELCOME!

THANK YOU….

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