BIODYE

BIODYE
INDIA PRIVATE LIMITED

Quality natural dyes for natural fibres

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The IFOAM organic definition

We would like to commend IFOAM for the effort to advance the debate on how to make textiles entirely organic.

The panel topic today leads us back to the IFOAM definition of organic agriculture, *"Organic agriculture is a production system that sustains the health of soils, ecosystems and people.*
"Principal of ecology **states that production is to be based on ecological processes, and recycling."**

We find no apparent ambiguity that might allow synthetic dyes, from unsustainable sources and not biodegradable, to claim a place at the organic table.

Indigo – synthetic

Synthetic indigo (CI# 73000)

- Synthetic indigo is a dyestuff i.e., the chromogen indigotin plus impurities/ additives
- Synthetic indigo is manufactured in a chemical factory from petrochemicals
- Impurities include toxic aniline and N-methylaniline residues from its reaction vessel
- Not biodegradable – incineration only recommended means of disposal
- toxic to daphnids and algae
- Small creatures do not live around the rims of natural fermentation vats containing synthetic indigo, nor can a frog survive a dip in the vat
- **Synthetic indigotin is called 'nature identical' by chemists**

Indigo – synthetic and natural 2

Natural indigo (CI# 75780)

- Natural indigo is dyestuff, i.e. indigotin plus impurities/ additives
- Dye is formed during steeping from precursor indican and enzyme indimulsin both made in the leaves of the plant
- Impurities include plant polymers and soil particles
- Biodegradable. If natural indigo ceases to be added to a natural fermentation vat, it loses its power to dye within 75 days. A sour vat will consume the indigo within 15 days.
- Small insects and creepy crawlies live around the rims of natural fermentation vats containing natural indigo, and frogs can hop in and out without harm

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POLLUTION OF SYNTHETIC DYEING

Hazardous waste disposal in India

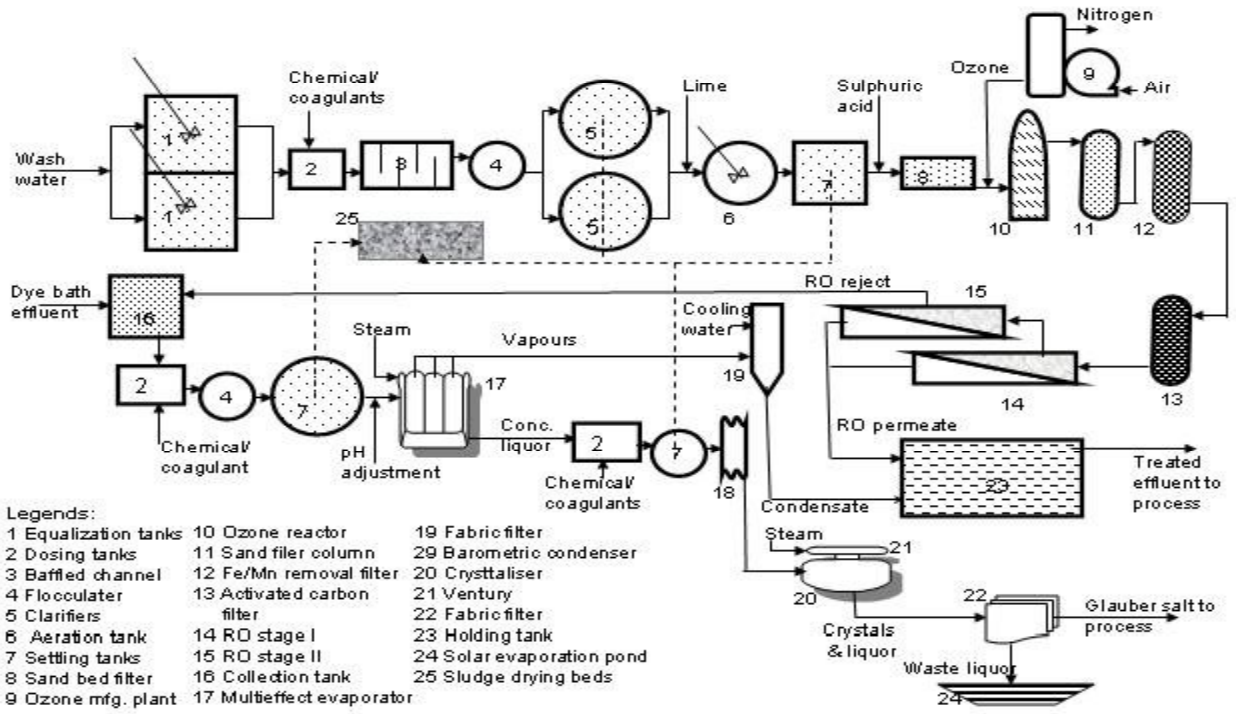
The Central Pollution Control Board (CPCB) in India categorizes process waste sludge from synthetic dye production and industrial use as hazardous. It mentions no exceptions. However, it does not define norms for proper disposal of this hazardous solid waste (see nos. 24 and 25 on next slide).

Result: Solid waste left stacked in backyards of dyeing units, on river banks and roadsides where it leaches back into the water or soil

Responsible European buyers insist that such waste be stored in properly constructed warehouses

Note: Solid waste from natural dyes and dyeing is not included in the CPCB list of hazardous waste

Fig. 5.1: Treatment scheme for recovery of water and glauber salt



Knitwear industry in Tirupur, India - 1

Order of Madras High Court – 22.12.06 22.12.06

- Over 700 bleaching and dyeing units dumped waste into the
- Noyyal river for more than ten years
- 2.8 million ha of agricultural land in 68 villages destroyed

Noyyal River pollution

- **2010-2011**budget: the governments in India gave grants of Rs.320 crore (€53 million) to build 20 common effluent treatment plants (CETPs) to treat textile process-house waste in Tirupur

Knitwear industry in Tirupur, India - 2

- **January 2011**: All 752 dyeing and bleaching units and effluent treatment plants in Tirupur ordered closed by the Madras High Court for violation of court order as effluent treatment ineffective or not functioning

- General Secretary, Tirupur Dyes & Chemicals Asscn.: "In recent days the multiple evaporator system concept has also started failing. At present we do not have any technology for zero discharge."

Taloja, near Mumbai July 2010

- 3,000 tonnes of hazardous waste from dye intermediates illegally dumped on 280 ha. plot
- Result: contaminated drinking water, valuable livestock dead, foul smell, skin infections and allergies

Threat to handloom craftsmen

Indelible synthetic dye on the hands of a tie-&-dye weaver

The same hands are used to prepare food

Professor Raphael Meldola – Presidential address
Society of Dyers and Colourists, 1910

“Let it be realised that the great industry upon which we now depend for our colouring matters is but a transitory phase in the history of applied science. Our coal seams cannot furnish everlasting supplies. It is a matter of a few centuries and then the supply of coal-tar must cease. The same remarks apply to petroleum and mineral oils generally here again the supply of raw material must sooner or later be exhausted. Shall we revert to vegetable colours and Tyrian Purple or will chemical science evolve new synthetic dyes from vegetable products such as wood-tar?”

Effluent treatment at BioDye

The waste is collected in four separate streams:
detergent water, vegetal extracts, alum and iron vinegar

1. Detergent water treatment:
   Alum is added to make it acidic;
   Lime is added to make it alkaline
   Alum is added to neutralise it
   Result: clear filtered supernatant water ready for release on agricultural land
2. Vegetal matter treatment:
   Alum-lime-alum as above
   Slight haziness remaining in water is cleared by adding iron salts
   to make it acidic, followed by lime to neutralise it
   If BOD is still high, it is run over a trickling filter or aerated to consume it
   Result: filtered clear supernatant water ready for release on agricultural land
3. Sludge remaining from 1. and 2. is composted for agricultural use

Pollution prevention

The BioDye philosophy has been "Pollution Prevention" rather than clean it up with an "End of the Pipe Solution". Pollution of the Noyyal River in South India is an example of the impracticality of the latter course.

Needless to add: when natural dyes are used, there will be zero pollution and increased green cover!

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GLOBAL ORGANIC TEXTILE STANDARD

AND

NATURAL DYES

GOTS and natural dyes

For the first time in natural dyeing, BioDye has developed a viable alternative to synthetic dyes, which will be described in a minute.

Volumes of natural dyed textiles are presently miniscule. Their impact on the general textile market is negligible and they present no threat to synthetic dyes now or in the years to come.

However, simply by the existence of a viable alternative, it is to be hoped that natural dyes can be given more weightage in the GOTS than at present, and that this may gradually nudge others to reconsider the possibilities of natural dyeing.

In the light of this, we would like to suggest some fresh criteria for reviewing and approving substances to be used in textile processing.

GOTS and natural dyes

The first change might be the opening of sections 2.4.6 and 2.4.7, which could begin, "Allowed are natural dyes and permitted auxiliaries or, when not available, those permitted auxiliaries and synthetic dyes that meet the requirements "

Relaxation of any of the present rules would be apt to give the wrong impression and discourage efforts to produce more environmental-friendly products. Rather, the hope would be to find dyes and auxiliaries increasingly in line with the organic ideal.

GOTS Fastness testing for natural dyes - 1

Light Fastness:

- Natural dyed fabric of deep and medium shades have acceptable fastness ratings by the current accelerated testing methods
- Pale shades, which can withstand a similar amount of sunlight under natural conditions, fade under accelerated exposure
- Research is needed to ascertain if this method is suitable for pale shades
- Acceptable value for pale shade could be reduced from 3-4 to 3.

GOTS Fastness testing for natural dyes - 2

Wash Fastness:

- Natural substances need to be washed in neutral detergent (pH 6.5 - 7.5).
More environment- and skin-friendly than the present alkaline detergents (pH 10 - 11) specified in the tests. In India, the General Standards for disposal in public sewers are pH 5.5 - 9.

- Fastness for staining should remain 3-4 but for change of tone may be reduced to 3, since natural dyes are affected by the pH of the water (Municipal water is of correct pH)

- Natural dyes can be safely and repeatedly washed at 30°C.
More environment-friendly than at 60°C as presently specified in the testing procedures.

GOTS Compliance

The GOTS criteria are properly designed for responsible natural and synthetic dyeing. We trust that the certifiers would ensure strict compliance by process houses of section 2.3.2 and section 2.4.11:

- Use of non-toxic and environmentally safe (biodegradable?) dyes and other inputs
- Regular audit inspections of production sites and storage sites for the hazardous solid waste.

As the use of natural dyes increases, an organic supply chain will become a reality and use of organic natural dyes both possible and desirable. At that point, production of synthetic dyes and their intermediates should also be in compliance with GOTS regulations 2.3.1-2 and 2.4.11.

GOTS AND NATURAL DYES

To summarize our suggestions:

- **Natural Dyeing should be given weightage in certified organic textiles**

- **Synthetic dyeing should be responsible – with its wastewater treated properly and its solid waste stored safely, either in-house or by Common Effluent Treatment Plants.**

Can textile processing be organic?

Textile processing can be organic providing the natural dyes and bio-degradable auxiliaries are all clearly specified and defined.

Textile processing as regulated by GOTS cannot be organic as long as synthetic dyes and other non-biodegradable ingredients are allowed.

The term ‘organic textile‘ is not an accurate description of any textile where synthetic dyes and auxiliaries are used.

A separate category for such textiles could be ‘Organic fibres with responsible synthetic dyes’. In order to avoid misuse of the GOTS organic terminology, this entire term should be compulsory on all marketing material and labels.

Even if it takes another couple of years for anyone to be able to claim a fully organic supply chain that would warrant the name ‘organic textile’ it should be there as the goal.

Until then, natural dyes and auxiliaries (definitions by GOTS) should be given a separate standard such as ‘Organic fibres with natural dyes’ – a term separate but equal with the label for synthetic dyes.. .

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THANK YOU