The case for banning endosulfan

G. K. Mahapatro and Madhumita Panigrahi

The ‘Commentary’ by Sreekumar and Prathapan that brings to light a few flaws in the medical reports, makes interesting reading. The endosulfan case of Malabar coast, considered as one of the worst pesticide disasters in the field of community health and toxicology, needs no introduction. This extended tragedy was reasoned out to the two-decades long aerial-spraying of endosulfan over the cashew estates of Plantation Corporation of Kerala (PCK) without a proper monitoring of its collateral impacts. After a multitude of media reports, subsequent several studies, court cases and years of pugnacious and widespread public protests, in 2003, the High Court of Kerala banned the sale and use of endosulfan within the state. Latest in 2011, it is enlisted under the persistent-organic-pollutant category, to be eliminated worldwide.

Pesticides in cashew – a critical evaluation

A proper understanding of the trends and patterns of the use of pesticides in cashew is essential for making a holistic analysis of the endosulfan issue. A review article describes how pesticides developed through 4–5 phases. The first phase is ‘subsistence’; in particular for cashew being grown on eroded soil prior to 1960. Shortly follows the second phase, i.e. ‘exploitation’ wherein irrigation, fertilization and crop-protection practices were introduced. DDT was the first insecticide to be used widely against tea mosquito bug Helopeltis antonii (Figure 1) followed by carbaryl, endrin, dieldrin and gamma-HCH (lindane) as the standards. The cashew plantations now under PCK were then under the Government during 1963–1997. From 1963 onwards, agro-chemicals were used extensively in cashew estates. Hand pumps along with toxic chemicals like endrin were in use without proper precautions. From 1980, ‘aerial spraying’ was started as it proved to be effective and economical in large-scale plantations. In the ‘exploitation’ stage, different generations of pesticides (organo-chlorines, organo-phosphates and carbamates, synthetic pyrethroids and botanicals) were tried and tested. The third one in the series was the ‘crisis’ phase that emerged as a result of indiscriminate use of pesticides coupled with the introduction of a large genetic variability through hybridization and varietal improvement programmes (Figure 2). This promoted the pest build-up in more susceptible types. For its additional fungicidal property, endosulfan has proved to be most effective in field trials across the country for the last couple of decades. It could protect cashew from bug (tea mosquito) – fungi (Colletotrichum) complex successfully, which is why it was adopted in large scale. The fourth and the worst phase, namely ‘disaster’, followed with all these problems aggravated to serious proportions coupled with allegedly all sorts of health hazards in Padre village, as reported by the Centre for Science and Environment (CSE), New Delhi. Many media reports over the last decade implicated endosulfan as the sole culprit. One good reason to cheer CSE, howsoever questionable its allegations may be is that it could, at least, trigger a serious scrutiny of the scientific community as well as the policy makers for environment-impact-assessment of...
The right to live in a pollution-free world is a basic human right; and this funda-
mental as pollutant 4.

99% goes waste and enters the environ-
ment. Add to this is the fact that
in PCK plantations. One can imagine
a conservative estimation (viz. endosul-
fan 2 ml/1, 51 water/tree, 100 trees/ha)
amounts to 3500 l of endosulfan per one
round spray. For a period of two decades,
its more than 70 tonnes in
PK plantations. One can imagine
(assuming even a half-life period of 3
months) how much would be left in the
environment. Add to this is the fact that
in an insecticidal application, more than
99% goes waste and enters the environ-
ment as pollutant 4.

Critical calculation

A critical look into the data on chemical
control over 3500 ha (under PCK planta-
tion), in the light of the recommended
three-round standard chemicals 8, on even
a conservative estimation (viz. endosul-
fan 2 ml/1, 51 water/tree, 100 trees/ha)
amounts to 3500 l of endosulfan per one
round spray. For a period of two decades,
it amounts to not less than 70 tonnes in
PK plantations. One can imagine
(assuming even a half-life period of 3
months) how much would be left in the
environment. Add to this is the fact that
in an insecticidal application, more than
99% goes waste and enters the environ-
ment as pollutant 4.

Concerns and counter arguments
in the Commentary 7

(1) While dealing with the clause sub-
heading ‘Sociological confounding issues
ignored’, the authors’ mention: ‘This
study had been designed to assess plau-
sible improvement in the reproductive
health of women following withdrawal
of endosulfan application. The study re-
port has specified that data on the repro-
ductive health events in all married
women in the study area were collected.
However, women are literally trans-
planted into the family of their husbands
following marriage, under the Indian
family system, for which Kasaragod is
no exception. This means, at least a sec-
tion of the women studied by the CMC
researchers was living outside the study
area with their parents during the period
of application of the insecticide.’

The table 1 (critique 1) in the medical report 9 should have been more appropri-
ately titled as ‘Natality-related (rather
than reproductive-related) events’. Even
when women were shifted/migrated from
unsprayed areas to sprayed areas, the na-\t

tality-related events were taking place
within the sprayed areas and were obvi-
ously post-nuptial.

Similarly, ‘many housewives in Banam
(unsprayed reference area) are likely mar-
ried into their respective families from
the neighbouring sprayed areas’. This
argument rather supports the fact that
despite this, the natality-related events
were lower compared to the sprayed
areas dataset, thereby making statistical
significance still robust.

(2) Inconsistencies in the results and
conclusions of the study. Endosulfan resi-
dues in blood samples reportedly 8 ranged
from 2.51 to 170 ppb, as against 0–
12.7 ppb found in the NIOH study 6. The
cited fourfold increase over 10 years, ac-
cording to the critique 1, based on such a
comparison sounds almost unfounded as
the sampling procedure, detection meth-
odologies and protocols might have been
different for these two different studies.
Even after the cessation of spraying, en-
dosulfan residues may still be present in
the environment. Let alone any increase,
the mere presence of endosulfan in blood
serum 6 is quite disturbing. The NIOH re-
port 6 observed endosulfan residues in
85% and 75% of female and male sub-
jects respectively. The report concluded
a close similarity between the spectrum
of the health effects observed in the study
population and those in the animal
experiments, and the possibility of endo-
crine-disrupting effects in its study. The
Centre for Water Resources Develop-
ment and Management (CWDRM)
reported no detectable endosulfan resi-
dues in water. In contrast, extremely high
levels of residues were observed in the
blood serum.

(3) The 2001 census data show that
Kasaragod does not have an increased
rate of any of the mental or physical dis-
abilities compared to other districts in
the state. There are no reliable data to
prove that there is a higher occurrence of
any disease or disability in the sprayed
area compared to the unsprayed area.
By stating so, it implies that the entire
Kasaragod district was sprayed with
endosulfan as against unsprayed other
districts. This is not the reality.

The allegedly increased health issues
in endosulfan-sprayed areas in Kasaragod
have not been proved conclusively by
any study till date. It is quite difficult to
exclusively prove the ill-impacts of a
pesticide like endosulfan in a country
like India, that too after almost a decade
of stopping the spraying schedules. If the
same method of spraying, viz. aerial
spray had been adopted for other toxic
pesticides like monocrotophos, etc. it
might have resulted in the same magni-
tude of problems as endosulfan report-
edly did. The fact that endosulfan is (at
least) suspected and is already under a
phase-out process in many developed
countries, (thcreby making a strong

ground for it to be dumped in India too),
further instils confidence in the agitating
masses. The fear psychosis amongst the
victims of the sprayed areas, many times
multiplied by media hype, must be dis-
pelled with proper care and counselling;
and the propaganda causing it must be
stopped for the larger good of the nation.

Circumstantial causality,
nevertheless national necessity

A lot of hype persists in the media about
banning endosulfan. A seed of suspicion,
however, sprouts in one’s mind when
concerted attention is drawn towards a
single pesticide. What is the ground rea-
lity, and whether it is a lobby played by
some influential forces against endosul-
fan, is a matter of past debate right now.
The more one searches on the Internet,
the suspicion rather soars. Available are
both negative 10 as well as supporting/
positive views on this controversial issue.
If reflected in scientific perspective, a
pertinent question arises as to why adverse
health effects similar to those seen in
Kasaragod have not been reported from
other parts of the nation consuming
endosulfan in much larger quantities?
[Kerala accounts for a meagre 1% of
total pesticide consumption compared to
Andhra Pradesh (14.3%), Maharashtra
(11%), Madhya Pradesh (10.1%), West
Bengal (9.3%) and Rajasthan (7.5%).] Is
there something unique about the
Kasaragod issue? An article in Frontline7
reasoned it out to the improper mode of
application, and blatant violation of the
laws and regulations behind the apparent
adverse effects of endosulfan. In another
article the after-effects of the endosulfan
ban was apprehended 8. Endosulfan is
banned in more than 75 countries; and
the demand for alternative pesticides
has increased after the ban. Some countries
like Argentina, Peru, Chile, Germany and
Benin are providing alternatives as well.
But are these methodologies suitable for
India? It is high time we realized the fact
that our country should walk along other
nations in the global fraternity, and that
the circumstantial pressure cannot be
ruled out in such situations.

Human rights perspectives cannot
be ignored

The right to live in a pollution-free world
is a basic human right; and this funda-
mental right to life is threatened by toxic chemicals, hazardous wastes, and contaminated drinking water and food. Human rights entail access to free, prior and informed consent by all sectors of civil society in the regulatory decision-making aspects of chemical safety, and to information on risks that pesticides pose to human health and environment. Majority of the pesticides currently in production and use have still not been adequately tested for their impact on human health and environment, particularly in the face of emerging concerns that challenge the central dogma of toxicology such as endocrine disruption, epigenetics, ongoing low dose exposures, etc. No doubt, the chemical industry plays a significant role in the global economy. But at the same time, it is a matter of grave concern that a steadily increasing share of the global chemical production is shifting to the developing and transition countries that lack the capacity to manage and regulate the compliance mechanisms for mitigating risks to human health and environment. We cannot afford avoiding global phase-out of hazardous, unmanageable chemicals, viz. pesticides, persistent bio-accumulative toxins, endocrine-disrupting chemicals that affect reproduction, immune and nervous systems, and substances that involve long-range transport. A global phase-out is essential in order to avoid banned and restricted chemicals from one country being sold or dumped in another. We ought to commit ourselves and call upon all stakeholders to act together and urgently reform and harmonize chemical-assessment, regulation and management, both regionally and domestically, so as to achieve a toxic-free future for all of us globally.

5. http://www.endosulfan.in/

ACKNOWLEDGEMENT. We thank Dr K. M. Sreekumar (KAU) for providing us the two medical reports for comments.

G. K. Mahapatro* is in the Indian Agricultural Research Institute, New Delhi, India; Madhumita Panigrahi, Human Rights Activist, New Delhi 110 012, India.
*e-mail: gagan_gk@rediffmail.com