Terminator seeds will result in genetic pollution

While complimenting P. K. Gupta for his explanation of the terminator technology for seed production (*Curr. Sci.*, 1998, **75**, 1319–1323), I wish to draw attention to the 'behavioural aspects' of these technologies in the social context. There have to be many top researches and academic feats but not for immediate usage in developing nations, more so, in such an extremely diversified cultural assemblage of human diversity as in India. More than 60 to 80% farmers in UP, Bihar, MP, Rajasthan, Tamil Nadu and Himachal Pradesh own less than ten acres of land and are very poor. They sow seeds for their own food and if the harvest is poor due to some reason, they do not get the seed. Terminator seeds will help in eradicating small farmers in due course as the seed from the market or farmers will always be mixed up with 'expiry date seed'. For many reasons the big farmers often do not want the small farmers to work independently.

Scientifically also, as acknowledged by the author, certain NGOs including our own group (Society of Bionaturalists) opine that the use of terminator seeds will result in genetic pollution of traditional varieties by cross-pollinating them. Indian farming is spread on all geographic contours including small fields on open hill tops and in remote forest areas. As we know, wild varieties (species) of all present day crops grow in wild and if by sheer chance the inter-specific or inter-varietal hybridization took place, our germplasm shall be doomed in the near future. According to Greenpeace, Novartis genetically engineered (GE) maize, has cross-pollinated an adjacent field of conventional maize in Germany (*Environment*, The British Council, Calcutta, 1998). Obviously, genetic contamination cannot be ruled out, which has created hue and cry in Germany.

However, experiments must continue in closed greenhouses as to produce a 'Switch gene mechanism' rather than terminator genes. The switch gene has to be a cytoplasmic gene interacting only with 'alike pollen-egg' compatibility.

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Alpha Guard radon survey

In a recent correspondence[1] dealing with radon surveys in areas of Himachal Pradesh using Alpha-Guard, Virk *et al.* have remarked that the 'efficacy of track-etch survey being conducted in India under a BRNS coordinated project of DAE is questionable'. This remark was based on a comparison of the Alpha-Guard results of surveys in dwellings with unusually high radon levels reported by Singh *et al.*[2] using track-etch techniques. It may be clarified that the latter survey was not a part of the BRNS radon survey project, and the possibly erroneous results reported therein cannot be extrapolated to pass a general judgement. On the other hand, the remark betrays on the part of the authors, a lack of understanding of the differences in the techniques used by Singh *et al.*[2] and that used under the BRNS project.

The survey by Singh *et al.*[2] was based on exposing bare solid-state nuclear track detectors (SSNTDs) in dwellings. These would record tracks not only from radon, but also from unspecified amount of radon progeny, thoron gas and thoron progeny. It is impossible to take into account the effects of the latter species in the calibration of such systems. The presence of thoron can give rise to significant excess tracks due to itself and its progeny (^{212}Bi and ^{212}Po), which could wrongly be interpreted as due to radon. This offers a possible explanation for the high radon values reported in the 1989 study, provided no other systematic errors exist.

It is precisely to overcome this deficiency that the radon/thoron discriminating dosemeters were developed by BARC[3] and deployed by the BRNS project investigators, including Virk. These have been calibrated against standard scintillation cells as well as Alpha-Guard with a high degree of reproducibility[3]. In conjunction with a theoretical methodology for dose extraction, they have been used for estimating the radon/thoron mixed field inhalation doses for monazite survey project in Kerala. While this system is capable of estimating time-integrated radon concentrations with good accuracy, it also has a novel feature of being able to estimate time-integrated thoron gas and the progeny concentrations. This is not achievable with the use of a bare track-etch detector as it would record only gross tracks due to all the alpha emitters. In the case of Alpha-Guard, progeny concentrations may be determined by coupling it with working level monitors, which may not be available with the authors.

The present disillusionment of Virk *et al.* is also in stark contrast to the positive conclusion drawn by Virk and Sharma[4] on the performance of DAE-BRNS dosemeters, about three months earlier. In this, the authors compared the results of radon surveys carried out in the Ramera and Astota villages of Himachal Pradesh using Alpha-Guard and the DAE-BRNS dosemeters and concluded: 'Considering the vast geographical area to be mapped for indoor radon levels in India, the efficacy of track-etch technique using plastic detectors is established from this intercomparison'. For ready reckoning of the readers, the relevant data of the authors (Tables 4 and 5 of ref. 4) upon which

Table 1. Radon levels reported by Virk and Sharma[4] as a part of an inter-comparison exercise between Alpha-Guard and DAE-BRNS dosemeters

	Radon level (Bq/m³) (Using Alpha-Guard)		Radon level (Bq/m³) (Using DAE-BRNS dosemeters)	
House code	August 1997	January 1998	August–December 1997	January–April 1998
Ramera (H.P.)				
A	118 ± 62	213 ± 51	196.0	130.9
B	108 ± 39	165 ± 45	97.7	164.2
C	138 ± 45	297 ± 60	57.1	279.6
D	66 ± 35	53 ± 40	31.6	59.4
E	159 ± 83	205 ± 55	70.2	–
Mean	118 ± 53	187 ± 50	90.5	158.5
Astota (H.P.)				
A	170 ± 56	–	53.6	59.8
B	210 ± 60	–	69.2	68.2
C	132 ± 40	–	55.1	100.6
D	100 ± 38	–	71.7	119.2
Mean	151 ± 49	–	62.4	87.0

this conclusion was based, is shown in Table 1. It is surprising that the authors have not made reference to this work in the paper[1] under discussion. The poor matching seen in Table 1 for some houses (especially in Astota village) could be due to the fact that, unlike track-etch dosemeters, 'Alpha Guard sampling was a spot sampling survey carried out for one hour only in each dwelling', as the authors themselves have noted[4]. It needs to be clarified as to how this situation has been rectified in ref. 1, before one places trust on their revised indoor radon values. In fact, their results[4] obtained with DAE-BRNS dosemeters, reveal a non-negligible presence of thoron also in Ramera and Astota villages, for the first time.

Thus, the authors have committed a *volte-face* in respect of their own earlier publications without providing adequate scientific discussions. Had they combined both the papers (refs 1 and 4) cited here into a single publication, such an absurd situation would not have arisen. It is earnestly felt that the publication of results in piece meal in different journals leading to contradictory conclusions is deleterious to the success of this nationally relevant BRNS project in which many universities from all over India are participating.

We wish to emphasize that there exists no scientific basis for questioning the efficacy of dosemeters supplied by DAE under the BRNS radon/thoron survey project. If at all, the remark of the authors questions their trust in the validity of their own previous measurements.

1. Virk, H. S., Kumar, N., Sharma, N. and Bajwa, B. S., *Curr. Sci.*, 1998, **75**, 430–431.
2. Singh, J., Singh, L., Ramola, R. C., Singh, M., Singh, S. and Virk, H. S., *Nucl. GeoPhys.*, 1989, **3**, 297–298.
3. Mayya, Y. S., Eappen, K. P. and Nambi, K. S. V., *Radiat. Prot. Dosim.*, 1998, **77**, 177–184.
4. Virk, H. S. and Sharma, N., *Radiat. Prot. Environ.*, 1998, **21**, 103–106.

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Response:

Y. S. Mayya has based his criticism by picking up two remarks 'out of context' from our papers and blowing them out of proportion. He seems to be oblivious of the fact that our paper in *Current Science* (ref. 1) was submitted earlier than the one quoted in ref. 4 but published later which led to the whole confusion in his mind, as revealed by his comments.

We have not committed any *volte-face* as both of our publications (refs 1 and 4) are based on field data recorded by the internationally calibrated Alpha-Guard and DAE-BRNS dosemeters, which are still undergoing field trials. Merits and drawbacks of both the techniques were highlighted in our papers. The presumption of Mayya regarding discrepancy of radon levels for Asthota village is itself questionable. The correlation coefficient between the Alpha-Guard and track-etch radon values for Asthota was found to be –0.91. We cannot make thoron the sole culprit for this mismatch.

During a recent workshop organized under the BRNS co-ordinated radon project (Trombay, 27–29 January 1999), of which Y. S. Mayya was the organizer, calibration exercises and the intercomparison of results confirmed the truth of my remarks that standardization of radon data is a must for all participating laboratories.

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