Imagine you could pop a scanner from your handbag to see precisely how ripe the bananas are that you want to buy, or to ascertain how long you can still store them before they need to be used in a fruit salad?

KNOWING WHEN IT'S TIME TO

eat your fruit

By Engela Duvenage

A nifty gadget, don't you think? And not at all too farfetched, it seems.

Detection systems have been developed to detect crop conditions by measuring the levels of chlorophyll and photosynthesis, and ultimately whether fluorescence is emitted when an ultraviolet light shines on a leaf or a fruit.

"As small size excitation sources, fibre probes and miniature-integrated spectrometers have become commercially available, a lot of development has been done in the past decade," explains Prof Hubertus von Bergmann of the Laser Research Institute (LRI) in the Department of Physics.

Together with physicists from Ghana's University of Cape Coast, Prof von Bergmann and LRI colleague Dr Christine Steenkamp recently developed a portable fibre-probe detection system which is already a vast improvement on similar models.

The LRI offers the only outcomes-based university program in laser physics in the country, and is a driving force in the African Laser Centre (ALC), a continent-wide initiative to stimulate laser physics. The LRI hosts regular ALC training courses at Stellenbosch for physicists from many African countries.

A few years ago Prof Von Bergmann, who is also an ALC director, toured African institutions to assess their research needs and capacity. "Quite a few physics groups were working on diagnostic devices that could benefit the horticultural industry," he remembers. "Research on such detection systems is of special interest to African universities where science with a specific agricultural outcome receives preference."

Researchers in this field use compact fluorescence detection systems to study plant growth and post-harvest losses of fruits. It can also detect various dermatological conditions, such as skin cancer or fungal infections.

The valuable contacts Prof Von Bergmann made led to two separate research projects being funded by the ALC and the National Laser Centre.

Prof Hubertus von Bergmann of the Laser Research Institute shows physics masters student Annelle Griessel and PhD student Gibson Nyamud how the improved portable fibre-probe detection system works. (Photo: Engela Duvenage)

During an extended research visit to Stellenbosch by Ghanaian Prof Paul Buah-Bassuah, the group designed a portable fibre-probe ultraviolet light emitting diode (LED)-induced fluorescence detection system. It is more robust, because it uses less optics, is easily operated, and is relatively immune to ambient light. The design is much more stable under harsh field conditions, which is ideal for on-the-spot measurements in storerooms and orchards.

"By using a LED source we save R25 000 and reduce cost to less than 10% for the excitation source, compared to less stable laser diodes (LD)," says SU physicist Prof Hubertus von Bergmann. "This saves almost 50% per instrument."

It is therefore more cost-effective for use within the African agricultural sector and in other less developed countries.

The system has been tested on lemons, bananas, mandarins and ivy plants.

Prof Buah-Bassuah's visit was followed by that of two Tunisian researchers, Dr Najoua Derbel and Ms Jaouhra Cherif from Tunis El Manar University. They used the system to detect the effects of cadmium poisoning in tomato plants.

"It looks very promising for both horticultural and agricultural applications where post-harvest monitoring becomes paramount and the ripening process in the storage and retail process relies on the environmental factors such as room and storage temperature," explains Prof von Bergmann.

"It is also essential to follow growth patterns of various breeding crops till harvest time, and to monitor their growth under specific stress conditions such as a lack of water or nutrients."

The developed prototype is the size of a dictionary. It is coupled with a laptop computer to download and analyse the recorded information. The data is provided to the user in graph format.

It is, however, not yet commercially available.

That, it seems, is not the physicists' baby. "We're into the science, not the packaging," laughs Prof Von Bergmann.

So maybe you'll have to wait just a little bit longer for your own pocket-sized banana-ripeness-meter.