Has Palm Oil a Protective Effect on Cancer?

The question now being addressed is "Has palm oil any anti-cancer effect?

Two recent experiments conducted on the rat model indicate that a palm oil diet fed before or after the period of cancer induction (i.e. during the initiation or promotion phase of cancer development) reduced cancer formation and progression

What Substances in Palm Oil are Responsible For Its Beneficial Effects?

Palm oil is composed of about 99% triglyceride and 1% of non-saponifiable minor components amongst which are the carotenoid pigments,chiefly beta-carotene, the Vitamin E (tocopherols and tocotrienols) and sterols

The fact that the explanation of palm oil's unusual beneficial behaviour in relation to atherosclerosis, thrombosis and carcinogensis cannot be found in its major glyceride components, suggest that the non-saponifiable minor-components may play important roles in this connection.

Low levels of serum beta-carotene and vitamin E have been associated with an increased risk of lung cancer.

Recently researchers at Harvard University Dental School reported that painting a solution of beta-carotene on hamster cheek tumours caused the cancer to regress and that higher concentrations of the beta-carotene cured the cancer.

At the biochemical level, studies conducted at the University of Massacnusetts, Amherst showed that beta-carotene can detoxify certain chemical carcinogens into harmless metabolites

Experiments conducted in Japan seemed to indicate that tocotrienols have anti-cancer properties.

The above reports are supportive of PORIM's own studies which showed that both crude palm oil which are rich in beta-carotene and RBD palm oil, that is devoid of the pigment, can confer protection on cancer promotion in the rats.

Recent findings also seem to suggest that palm oil's anti-thrombotic effect, and its lack of effect on the level of blood cholesterol may be found in the oil's abundant supply of analogues of Vitamin E, the tocotrienols. From the University of Wisconsin has come the exciting report that alpha-tocotrienol has a potent inhibitory effect on the activity of a liver enzyme HMG-CoA reductase involved in cholesterol production, while a Canadian researcher made the important observation that gamma-tocotrienol is effective in reducing blood clotting tendency in a human blood suspension

Conclusion

There is now an overwhelming amount of evidence to show that excessive amounts of dietary fats, especially the saturated fats, can considerably increase one's risk to coronary heart disease, and that the consumption of polyunsaturated oils reduces plasma cholesterol and clotting activity, thereby reducing the risk of the disease

However recent evidence indicates that the role of dietary fats presents us with a dilemma for although polyunsaturated oils may protect against coronary heart disease, there is now fear that excessive amounts of polyunsaturates may promote cancer. In contrast, the saturated fats although atherogenic may confer protection against certain types of cancer.

Recent findings on palm oil suggest that it is a unique oil in the sense that it does not promote atherosclerosis, it is strongly anti-thrombotic and it can reduce and inhibit cancer development.

It is however clear that more experimental studies on both the animal model and humans need to be conducted to confirm and extend the beneficial effects of palm oil The current state of knowledge indicates that while the glyceride fatty acid composition of the oil is important, there is a need to focus attention on the non-glyceride minor components from which explanations for some of palm oil's beneficial effects are likely to arise

(Y.H Chong)

● RESEARCH NEWS

CHARACTERIZATION OF OIL IN THE CENTRIFUGE SLUDGE DISCHARGE

In a conventional palm oil mill, the crude oil is subjected to settling and the underflow from the continous settling tank is fed to a nozzle type centrifuge. By centrifuging, the majority of the oil in the underflow can be recycled but about 2 to 3% of the total oil present in fresh fruit bunches is still lost in the nozzle discharge or sludge Analysis of the oil content of the sludge is usually carried out using the soxhlet extraction method which measures the total oil content and does not differentiate the various forms of oil present Recent research studies show that the oil in the sludge can be identified and quantified as 30%

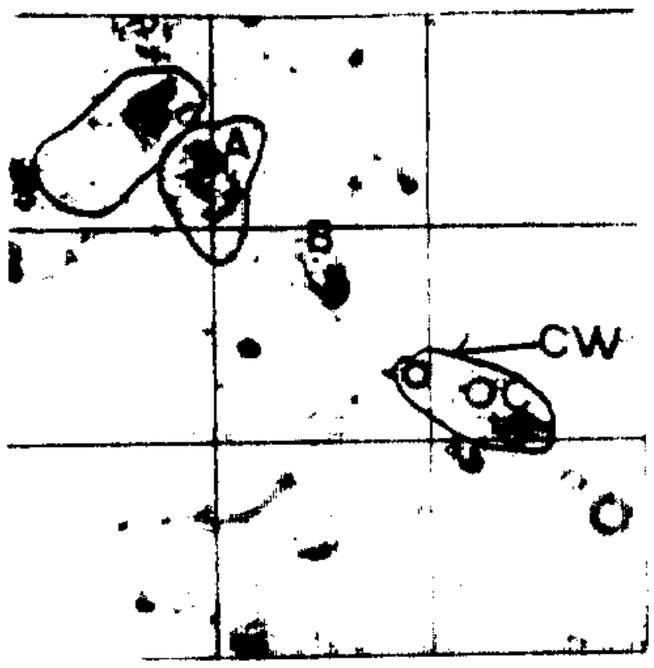

Figure 1 Sludge viewed under the optical microscope, (10 × 10 mg)

A: Cell with no oil droplet
B: Cell debris
C: Cell containing oil droplets
CW: Cell wall

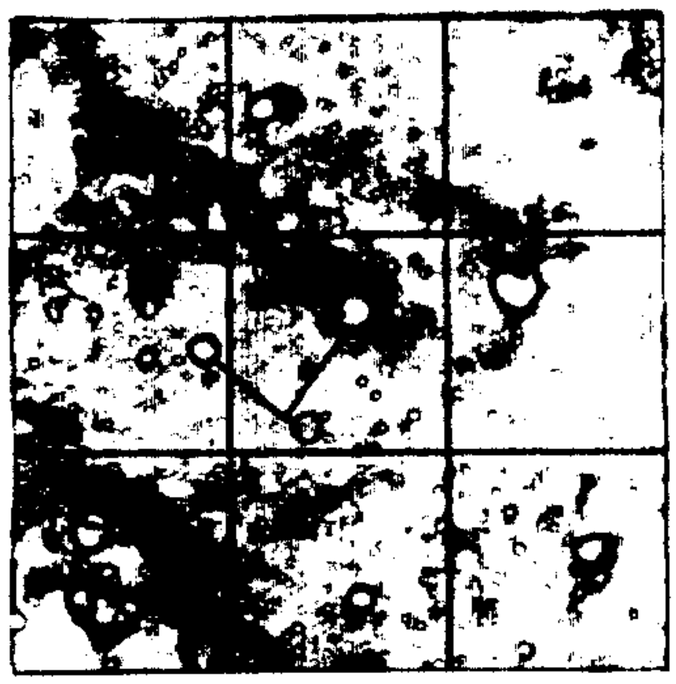

Figure 2 Sludge after Celluclast treatment (10 × 10 mag)

O: Oil droplets
Note. No cell wal around oil droplet

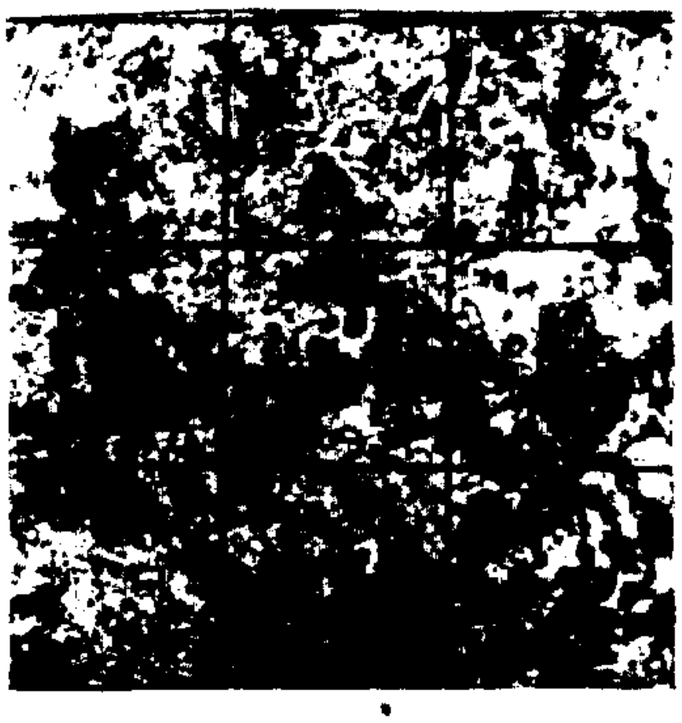

Figure 3. Residual solids after Celluclast and detergent treatment (10 × 10 mag)
Note: No oil droplets observed

free oil droplets, 56% oil that can be released by combined enzyme and detergent action and 14% residual oil which remains diffused and bound to cell debris

When the sludge is viewed under an optical microscope a lot of free oil droplets, plant cells and cell debris can be observed (*Figure 1*) The free oil droplets vary in diameter from 2 microns (μm) to 14μm, with a mean of 4 μm These minute oil droplets can be separated from the water and solids by high speed centrifugation of at least 7,600 G.

The plant cells are irregular but mainly ellipsoidal in shape. The long axis ranges from 10 μm to 150 μm while the short axis ranges from 13 μm to 100 μm. Some of these cells contain a droplet of oil inside These oil droplets are much larger than the free oil droplets with diameters ranging from 5 μm to 80 μm with a mean of 25 μm. The cell wall is easily ruptured by the enzyme Celluclast but the fine oil droplets do not separate out from the solids when centrifuged (*Figure 2*). A detergent wash followed by centrifugation is necessary to separate the oil droplets from the ruptured cells. No more oil droplets are observed in the residual cell debris after centrifugation (*Figure 3*) but by Soxhlet extraction of the dried solids more oil can be recovered.

The oil separated by centrifugation mainly exists as a very stable oil-in-water emulsion; the oil being finely dispersed in the water medium. The stability could be due to some surface active agents which form an adsorbed film around the droplets thus preventing coalescence. Possible emulsifying agents in the sludge are the fatty acids, monoglycerides, diglycerides, proteins and phospholipids. Finely divided cell debris surrounding the oil droplets may contribute to their stability too. Bigger oil droplets present can coalescence easily and form a homogenous phase of oil.

(Chow Mee Chin)

● PRODUCT NEWS

INTELLIGENT TRANSMITTERS

The Foxboro I/A Series Intelligent Transmitters complement the newly introduced Foxboro I/A Series Control System. Most "smart" microprocessor-based transmitters use conventional strain gauge or variable capacitance sensors whose analog output must be converted to a digital signal. The patented digital quartz tuning fork sensor in the I/A Series Intelligent Transmitters, however, provides the transmitter's microprocessor with a direct digital signal As a result, when used in conjunction with a digital control system, like the I/A Series Control System, there are absolutely no error producing A/D conversions.

To provide superior compensation for secondary effects, the Intelligent Transmitters utilize separate digital quartz tuning fork sensors to accurately measure transmitter temperature and static pressure. These secondary measurements are then fed into the transmitter's microprocessor for compensation based on dynamic process and environmental conditions What's more, the transmitter's microprocessor performs continuous error-checking and self-diagnostics to ensure the validity of the measurements.

All this, and a lot of other useful information, is available to the control system through the direct digital communication link between the transmitter and the control system Messages are sent in real time, ten times per second — so neither accurcy no totalization degrades, even on fast-changing flow loops

The digital communication link is bidirectional. This allows a broad range of configuration and maintenance functions to be performed remotely from any workstation in the system— including a compact Hand-Held Terminal, or an adequately equipped personal computer. And this communication to the field can take place without interupting the transmitter's output signal.

In addition to displaying primary and secondary measurements in engineering units, the digital communications link provides the operator with information on transmitter range limits, damping, failsafe, tag name, number, location, serial number, and the date of last calibration. This information can be utilized for control, trending, alarming, manual or automated maintenance functions, *etc.*

The accuracy and validated nature of the measurements let you take full advantage of computer optimization and statistical process control techniques.

Even if you presently use a 4 to 20 mA control system, I/A Series Intelligent Transmitters will let you avoid the A/D conversion at the critical point between the sensor and the microprocessor, and will keep your options open for complete digital integration in the future, from the digital sensor all the way to the manager's desk.

For details on I/A Series Intelligent Transmitters, contact Foxboro (M) Sdn. Bhd.