BIOLIFE

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Industrial Banana Plantation Through Tissue Culture

Jain Tissue Culture development started in Jalgaon "the banana bowl of India" where it supports all the suitable facilities for the production and the yield is much higher than the national average of 8 Kg/plant to 12 Kg/plant. Intensive trials were carried out at high-tech R&D firms to determine agronomic practices and growth parameters for select promising varieties from among Shrimanti, Basrai, Williams and Grande Naine (GN). There is an independent R&D lab which works continuously for improvement of micro propagation protocols for enhanced quality and research into system development of new crops. Virology lab works for virus indexing of carefully selected suckers and tissue culture plantlets. There is also a biotech lab for analysis of genetic traits in planting materials and seed. Lastly, analytical lab works for physical, chemical and microbiological analysis of leaf, soil and potting media.

Through tissue culture, the crop is ready to harvest in 11 to 12 months from plantation whereas in traditional plantation it takes 15-20 months. Costs of irrigation, labor, and cultivation are less because crop period is shorter than the traditional one. Round the year planting is possible for tissue culture as seedlings are made available throughout the year and two successive ratoons are possible in a short duration which minimizes the cost of cultivation. More importantly, new varieties can be introduced and multiplied in a short duration. Low mortality of JTC plants is ensured by fully hardened saplings in poly bags. JTC bananas fetch a premium in the marketplace and thus farmers are able to recover the full value of JTC saplings through the sale of daughter suckers.

Dr. F H Ansarey
Executive Director
ACI Agribusiness

Figure: Jain Tissue culture in the growth room

BIOLIFE

Contents

3

Perception of Sustainable Crop Agriculture through Plant Breeding

Sustainable agriculture involves in the appropriate management of all the resources for development of agriculture to satisfy human needs of the time for health and development without compromising the future needs or over-exploiting the available resources.

4

Res-sol Liquid

On 21 December 2016, ACI Animal Health launched Res-sol Liquid. Res-sol Liquid contains alkalizers that help to break up the H_2CO_3 (Carbonic acid)

6

ACI at French Trade Show 2016

On 9-10 December 2016, France Bangladesh Chamber of Commerce and Industry (CCIFB) organized French-Bangladesh Trade Show 2016 at Le Meridien Hotel,

9

Genetic Code for Leaf Shape in Cotton

Researchers know that the variation in leaf shapes can mean big differences in a farmer's bottom line.

Perception of Sustainable Crop Agriculture through Plant Breeding

y= (u+ Gm + g + e + g x e) + (average of A + D + I + Q/ 4)

Sustainable agriculture involves in the appropriate management of all the resources for development of agriculture to satisfy human needs of the time for health and development without compromising the future needs or over-exploiting the available resources. This theme has been adopted aiming at developmental issues concomitant to the growth and development of agriculture and having that development to sustain over generations. It is something which is dynamic and keeps on moving towards improvement over the already improved but sustained one (Rahman 1978, Quasem & Rahman 1993; Rahman, 1995, 2001, 2012). Therefore, the present concern for sustainable agriculture is to: **(i)** optimize the input use efficiency leading to best production without losing productivity of the resources and factors that governs such production; (ii) use best techniques for development of new varieties not only for quantity, but also for quality in respect of nutritional traits, investment as to rate of return, and time duration for products (y= (u+ Gm + g + e + g x e) + (average of A + D + I + Q/ 4) (McCouch, 2004; Slade et.al 2005; Slatkin 1999, Zollner & Haeseler 2000; Bruce Walsh, 2006; Rahman, 2009 & 2012) and (iii) protect the environment, traditional genetic resources, related knowledge and habitats that support maintenance of the biodiversity by actions.

The sustainability of crop agriculture is more important when we consider changes in the environment and increase in population from 172.844 million of 2016; to 249.52illion (Projected) by 2045 (www. Bangladesh population, 2016) . Where there are more than 41 million people are under upper poverty line in 2015 (24.8%) and under lower poverty line (12.9%) around 20 million (7th FYP page 81). A close look at the growth performance of the agriculture subsector crops and horticulture (BBS 2015) and contribution to GDP indicate that the contribution to GDP has declined from 11.4 in FY10 to 8.8% in FY15. This linear decrease was although due to increase in other sectors, but the indication needs to be seen also from the view point of increased food need in future years to provide food to increased mouths and to reduce population under poverty line. Water Use Efficient (WUE) wise there should be more Aus and Aman rice varieties than boro even more of wheat and maize. While still better are wheat and maize with potato under sprinkler irrigation system. The experimental yields or productivity of varieties being developed are high but the national average is quite low, this means either **(i)** the yield performance of the varieties have not been tested through appropriately designed G-E interactions; or **(ii)** the farming community are not using the inputs as recommended; or **(iii)** low quality inputs tagged with absence of appropriate market price of the products at post-harvest conditions. It is here the plant breeders should give their attention to develop more day/season neutral varieties having high yield potentials per day with good nutrient balance in the products of food & feed uses. These types of varieties will be more acceptable to the farming community for increased adoption.

Prof. Lutfur Rahman
Advisor, ACI Agribusiness & Head of Advanced Seed Research & Biotech Centre

Res-sol Liquid

On 21 December 2016, ACI Animal Health launched Res-sol Liquid. Res-sol Liquid contains alkalizers that help to break up the H_2CO_3 (Carbonic acid) and release excess CO_2 (Carbon dioxide) out and Urinary acidifiers which fight the acidosis that has already set in by excreting out more of acid ions. It also contains Buffers which play a potent supportive role in restoring theionic and pH balance of the body and Aminonitrogen that liquidizes and clears the mucus clogging brings about urinary acidifications and also helps in breaking down the accumulated H_2CO_3 to expel out more of CO_2. Res-sol Liquid is used to improve respiration and reduce CO_2 accumulation. It helps to enhance Oxygen availability for metabolic reactions and ensure faster recovery. Res-sol Liquid also helps to reduce treatment cost and increase immunity of bird by high power biological oxidation. Res-sol Liquid is available in 100 ml and 500 ml packs.

Ruchi-Sol Liquid

ACI Animal Health launched Ruchi-Sol Liquid on 21 December 2016. It contains digestive enzyme 8, Herbal immunostimulant2, amino acids 3 & 5 vitamin B complex. Ruchi-Sol Liquid increases appetite, enzyme secretion, digestion of feed, involve metabolism, energy production, RBC production, increase production and help to protect the vitamin B complex deficiency. It helps to lay eggs in layer and love bird and prevent the uterine prolapse and paralises. Ruchi-Sol Liquid also increases survival rate of fi¬sh fry and helps in molting of shrimp. Ruchi-Sol Liquid is available in 100 ml and 500 ml packs.

Foliron Plus (Vet)

ACI Animal Health launched Foliron Plus (Vet). Each 5 ml of Foliron Plus (Vet) contains Elemental Iron 20 mg, L-Methyl Folate 100 mcg, Vitamin B1 10 mcg, Vitamin B12 75 mcg, Niacin 30 mg and flavored syrup base q.s. to 5 ml. It is used to supplement iron during chronic blood losscaused by parasites and flea infestation and enhance poultry and livestock growth. Foliron Plus (Vet) helps to prevent vitamins and minerals deficiency and recovery Anemic condition. It also helps to improve better production, overall health, appetite and reduce anorexia. Foliron Plus (Vet) was launched on 4 September 2016. It is manufactured by Anthem Cellutions (India) Pvt Ltd.

Aci-Levo® (Vet)

Aci-Levo® (Vet) is a Fluoroquinolone antibiotic. Aci-Levo® (Vet) contains Levo oxacin which is a third generation fluoroquinolone antibiotic which is effective against a number of Gram–positive & Gram–negative bacteria and specifically highly effective against the organisms that cause atypicalpneumonia. Aci-Levo vet reduces the bacterial growth by inhibit the growth of topoisomerase IV enzyme of Gram positive bacteria and DNA gyrase enzyme of Gram negative bacteria. Aci-Levo vet can enter into cells easily via porins & therefore are often used to treat intracellular pathogens such as Legionella pneumophila & Mycoplasma pneumonic. Aci-Levo vet is twice as active as its isomers of first & second generation quinolones. It is one of the so called respiratory quinolone and effective against number of Gram-Negative, Gram-positive, anaerobic bacteria & Mycoplasma.ACI Animal Health launched Aci-Levo® (Vet) on 21 December 2016. It is available as 100 g sachet.

ACI at French Trade Show 2016

On 9-10 December 2016, France Bangladesh Chamber of Commerce and Industry (CCIFB) organized French-Bangladesh Trade Show 2016 at Le Meridien Hotel, Dhaka. Both ACI Seed and ACI Animal Health participated in the Trade Show and exhibited their innovative products as well as services. Since the emergence of ACI Seed, ACI has been working with renowned French seed company H M Clause which is dedicated to innovative and sustainable development of the highest quality vegetable seeds. ACI Seed imported quality seeds of Cauliflower, Okra, Tomato, Chilli, Bitter Gourd, Knolkhol, Sponge Gourd, Water Melon, Snake Gourd, and Carrot from H M Clause which are high yielding and disease resistant varieties and performed better in Bangladesh conditions. In the show, around 17 companies exhibited as most of them have a joint venture with French Companies. Mr. Nasrul Hamid, M.P., Honorable State Minister, Ministry of Power, Energy & Mineral Resources inaugurated the program.

Launching of Bumper Gypsul

ACI Fertilizer launched 'Bumper Gypsul' - a value added product in December 2016 considering a high potential market of Sulphur & Calcium in Bangladesh. The product is Sulphur enriched Mineral Gypsum containing Sulphur - 50% and Calcium - 23%. The main objective of launching the product is to increase the market share of Gypsum and Sulphur. The Gypsum market size is more than 1 lac MT and Sulphur is 15 Thousand MT.

The key benefit of the product is to help the plant's growth in time, improve the nutrient uptake ability, keep the pH at an optimum level, and control the toxic constituents in the soil. The nutrient is more readily available for the plant. The pack size of Gypsul is 2 kg and the dose is 15-20 kg per hectare.

Training on Increased Urea Efficiency with NEB

In December 2016, ACI Fertilizer conducted several demonstrations and training program on NEB - Nitrogen Efficiency Bioavailability for retailers and farmers in areas like Rangpur, Dinajpur, Munshiganj, Comilla and Bogra where potato cultivation is high. Potato is one of the potential crops in this running season. Farmers also use a large volume of fertilizers, especially Urea to get maximum return from their cultivation. NEB is 100% natural product produced from root exudates in USA. It is used with Urea for increasing the efficiency of Urea through increasing the beneficial microbes in the root zone of the plants and improving the Nitrogen availability for the plants. In Bangladesh about 26 Lac MT Urea is used and in Potato it is more than 1 Lac MT. The dose of the product is 2-3 ml per kg Urea which will save up to 50% Urea used.

ACI Motors' Institutional Family Night

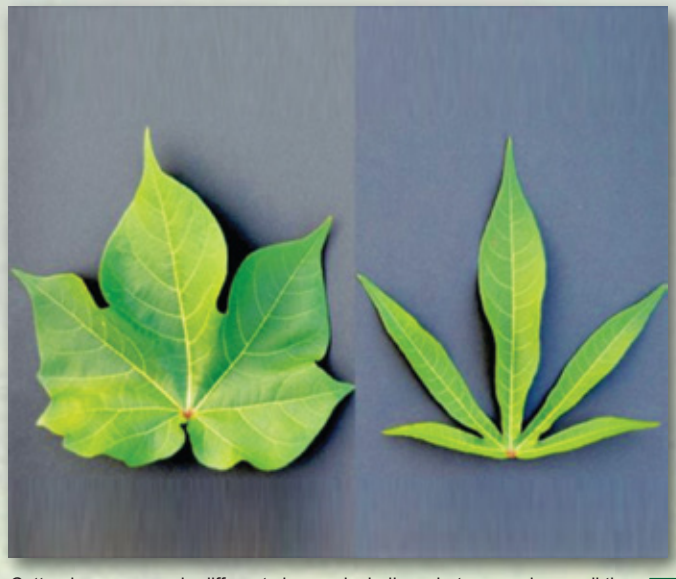
ACI Motors hosted "Institutional Family Night" on 17 December 2016 at ACI Centre to celebrate the collaboration of ACI Motors and government and non-government institutions in promoting farm mechanization in Bangladesh. From the beginning of their journey, ACI Motors Limited has had the opportunity to work directly and indirectly in various public and private projects, through which they have been able to reach the doorstep of the farmers with traditional and new agricultural machineries. The program was inaugurated with a welcome speech from the Managing Director of ACI Formulations Limited, Ms. Shusmita Anis. Officials from DAE, BADC, BARI, BRRI, TMSS, Ministry of Agriculture, LGED, FAO, EQSSP, IAPP, Bangladesh Army, Bangladesh Police and Corporates from Construction Sector gathered with their families to grace this event. Executive Director of Finance and Planning of ACI Ltd. Pradip Kar Chowdhury was also present in the ceremony along with representative officials of other various departments. Chief Business Officer of ACI Motors Mr. Subrata Ranjan Das; General Manager (IDS), Tushar Kanti Saha; General Manager (Sales), Md. Azam Ali were also present in the program. To entertain the audience, a cultural program was arranged with performances of two renowned artists of Bengali Classical Music, Manomay Bhattacharya and Modhurima Dutta Choudhury.

Genetic Code for Leaf Shape in Cotton

Researchers know that the variation in leaf shapes can mean big differences in a farmer's bottom line. Now, a new discovery gives plant breeders key genetic information they need to develop crop varieties that make the most of these leaf-shape differences.In a paper published Dec. 20, 2016 in the Proceedings of the National Academy of Sciences, NC State researchers and colleagues from the Danforth Plant Science Center, the U.S. Department of Agriculture and Cotton Incorporated describe how they used genomic and molecular tools to find the location of the DNA sequence that determines major leaf shapes in upland cotton.

The researchers also describe how they manipulated the genetic code to alter the shape of a cotton plant's leaves in potentially beneficial ways.This discovery represents a significant step toward developing cotton varieties that produce higher yields at less cost to the farmers, said Dr. VasuKuraparthy, an associate professor with NC State's Department of Crop and Soil Sciences and the project's principal investigator. Scientists have recognized that cotton plants with leaves that have five deep lobes, like the leaves of the okra plant, offer advantages to farmers over what researchers refer to as "normal" leaves. Dr. Ryan Andres, a postdoctoral researcher who worked in Kuraparthy's lab while he was a graduate student, said the so-called "okra" leaf cottons are less susceptible to boll rot than the stably yielding "normal" leaf cotton varieties.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily



Cotton leaves come in different shapes, including what researchers call the "normal" shape (left) and "okra" shape (right).

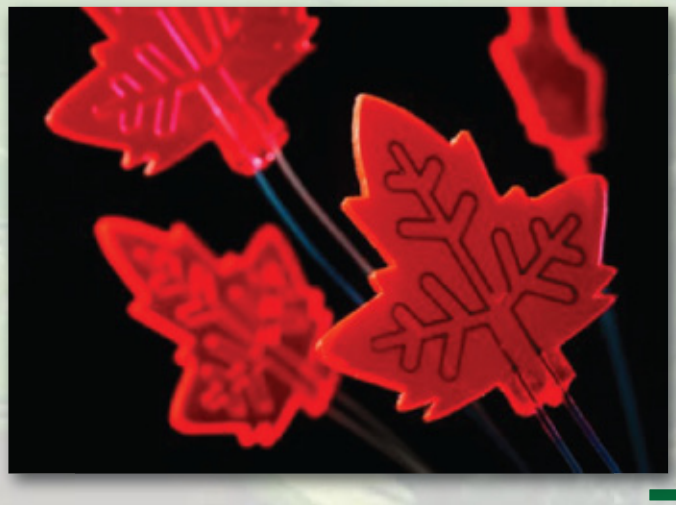
Photo Credit: VasuKuraparthy

Artificial Leaf as Mini-Factory for Drugs

To produce drugs sustainably and cheaply, anywhere you want. Whether in the middle of the jungle or even on Mars. A 'mini-factory' whereby sunlight can be captured to make chemical products. Inspired by the art of nature where leaves are able to collect enough sunlight to produce food, chemical engineers at Eindhoven University of Technology (TU/e) have presented such a scenario. They describe their prototype reactor -- consciously shaped as a leaf -in journal AngewandteChemie.

Using sunlight to make chemical products has long been a dream of many a chemical engineer. The problem is that the available sunlight generates too little energy to kick off reactions. However, nature is able to do this. Antenna molecules in leaves capture energy from sunlight and collect it in the reaction centers of the leaf where enough solar energy is present for the chemical reactions that give the plant its food (photosynthesis).

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily



Even with the naked eye the amount of light captured by the 'mini-factories' is visible, lit up bright red. The 'veins' through the leaves are the thin channels through which liquid can be pumped. The start products enter the one channel, light causes the reactions and the end product comes out via the other channels.

Photo Credit: Bart van Overbeeke

Capturing Disease-Resistant DNA

RenSeq (1) is the method to sequence Resistance (R) genes that confer disease resistance in plants. Each plant typically carries hundreds of potential R gene sequences, encoding NB-LRR proteins, identified by the presence of specific sequence motifs. R genes are often part of families of closely related sequences. While shared sequences make it possible to capture the R-genes, it also makes it hard to tell them apart and find the exact gene that enables plants to survive attack. Longer molecules and sequences of DNA allow easier and more accurate genetic analysis to identify variation.

The NB-LRR gene family enables plants to withstand infection from a suite of diseases and form a second line of defence. After a pathogen has managed to invade a plant, it uses 'effector' molecules to weaken a plant's defences -- the R gene proteins recognise these 'effector' molecules and signal to the plant to activate defence responses -- killing cells around the site of infection in an attempt to stop it spreading. This constant evolutionary arms race between plants and pathogens, whereby the organisms causing disease in plants are mutating to avoid plant defences, causes the plants to evolve through changes in their own genetic makeup. This is where a huge variety of R genes come into play that are

Lead author of study Dr. Matt Clark (left) and Michael Giolai, post-graduate student in the Clark Group, by the PacBio Sequel (next-generation sequencing platform used for study) at EI.
Photo Credit: Earlham Institute

highly similar in structure and DNA sequence. Researchers at the Earlham Institute (EI), The Sainsbury Laboratory (TSL) and the James Hutton Institute, have found a new way to decipher these large stretches of DNA to discover and annotate pathogen resistance in plants.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily

Plants' Response to Heat Stress: Time Matters'

Climate change and recent heat waves have put agricultural crops at risk, which means that understanding how plants respond to elevated temperatures is crucial for protecting our environment and food supply. For many plants, even a small increase in average temperature can profoundly affect their growth and development. In the often-studied mustard plant called Arabidopsis, elevated temperatures cause the plants to grow longer stems and thinner leaves in order to cope with the heat stress. New work led by Carnegie's Zhiyong Wang uncovers the system by which plants regulate their response to heat differently between daytime and nighttime. It is published by Nature Communications.

One protein called Phytochrome Interacting Factor 4 (PIF4) is crucial to coordinating a plant's response to elevated temperature by activating the genes that help the plant deal with heat stress. But it only seems to be active during daylight hours. Wang and his team set out to find out what was constraining PIF4's activity to daytime. They found that PIF4 is, in turn, regulated by another protein called Timing of CAB Expression 1 (TOC1), which is a part of the biological

circadian clock proteins that accumulate at the end of the day. TOC1 binds to PIF4 and inhibits its activity in the evening and through the night. The disappearance of TOC1 at dawn allows PIF4 to respond to warm temperature in the morning. Until now, how the circadian clock helps a plant's survival of heat stress was unknown.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily

'Ant-Like' Bees Discovered in Desert

Though declines in bee populations have heightened awareness of the importance of pollinating insects to the world's food supply, numerous bee species remain undescribed or poorly understood. Utah State University entomologist Zach Portman studies a diverse group of solitary, desert bees that aren't major pollinators of agricultural crops, but fill an important role in natural ecosystems of the American Southwest, including the sizzling sand dunes of California's Death Valley. With Terry Griswold of the USDA-ARS Pollinating Insects Research Unit at Utah State and John Neff of the Central Texas Melittological Institute in Austin, Portman reports nine, newly identified species of the genus Perdita in the December 23, 2016, issue of Zootaxa. His research was supported by a National Science Foundation Graduate Research Fellowship awarded in 2011 and a Desert Legacy Grant from the Community Foundation.

Unexpected finds include the curious ant-like males of two of the species, which are completely different in appearance from their mates. "It's unclear why these males have this unique form, but it could indicate they spend a lot of time in the nest," Portman says. "We may find more information as we learn more about their nesting biology."

Utah State University entomologist Zach Portman reports nine, newly identified species of desert bees of the genus Perdita, including two species of ant-like males (pictured), which are completely different in appearance from their mates.

Photo Credit: Zach Portman/Utah State University

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily

Common Insecticides Riskier Than Thought

Neonicotinoids -- the most widely used class of insecticides -- significantly reduce populations of predatory insects when used as seed coatings, according to researchers at Penn State. The team's research challenges the previously held belief that neonicotinoid seed coatings have little to no effect on predatory insect populations. In fact, the work suggests that neonicotinoids reduce populations of insect predators as much as broadcast applications of commonly used pyrethroid insecticides.

"Predatory insects contribute billions of dollars a year to agriculture through the elimination of crop pest insects," said Margaret Douglas, postdoctoral researcher in entomology, Penn State. "We have found that neonicotinoid seed coatings reduce populations of these natural enemies 10 to 20 percent." According to John Tooker, associate professor of entomology, Penn State, the use of neonicotinoids has risen dramatically in recent years, especially for large-acreage crop species like corn, soybeans and cotton. The insecticide is most often applied to seeds as a prophylactic coating. When the seeds are planted, the insecticide enters the soil where some of it is taken up by plant roots. The chemical then runs systemically through the plant, protecting young seedlings from insect pests.

Neonicotinoid coatings on corn and soybean seeds reduce populations of predatory insects, like this tiger beetle (Cicindelasexguttata), as much as broadcast applications of commonly used pyrethroid insecticides.

Photo Credit: Ian Grettenberger, University of California, Davis

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily

Red Cabbage Microgreens Lower 'Bad' Cholesterol

Microgreens are sprouting up everywhere from upscale restaurants to home gardens. They help spruce up old recipes with intense flavors and colors, and are packed with nutrients. Now testing has shown that for mice on a high-fat diet, red cabbage microgreens helped lower their risk factors for developing cardiovascular disease and reduce their weight gain. The report appears in ACS' Journal of Agricultural and Food Chemistry. Microgreens are tender, immature plants and herbs that take only a week or two to grow before they're ready for harvesting. A growing body of research suggests that microgreens could offer more health benefits than their mature counterparts. And since previous studies have shown that full-grown red cabbage can help guard against excessive cholesterol, Thomas T.Y. Wang and colleagues wanted to see if red cabbage microgreens might have a similar or even greater effect than their larger counterparts.

To test their hypothesis, the researchers used mice that were a model for obesity. These animals also tend to develop high cholesterol and other risk factors for cardiovascular disease. The team divided 60 of these mice into different diet groups. They received food low in fat or high in fat, and with or without either red cabbage microgreens or mature red cabbage. Both the microgreens and mature cabbage diets reduced

In an animal study, red cabbage microgreens helped lower "bad" cholesterol.
Photo Credit: American Chemical Society

weight gain and levels of liver cholesterol in the mice on high-fat diets. But the study also showed that microgreens contained more potentially cholesterol-lowering polyphenols and glucosinolates than mature cabbage. The baby plants also helped lower LDL, or "bad," cholesterol and liver triglyceride levels in the animals.

(Source: Agriculture and Food News, ScienceDaily. www.sciencedaily

Believe it or not!

- The name for chocolate comes from the Aztec word "xocalati", which means "bitter water".
- Chocolate comes from a fruit tree; it's made from a seed.
- It takes 400 cocoa beans to make one pound of chocolate.
- Spanish royalty gave Chocolate cakes in their dowries.
- Chocolate acts as a mild anti-depressant, since it emits serotonin and endorphin in brain.

Nutrition Chart

Dark Chocolate (1 bar or 162 g)

Cholesterol	13 mg	Potassium	906 mg
Sugar	78 g	Sodium	39 mg
Total Fat	51 g	Dietary fiber	11 g
Protein	8 g		
Caffeine	70 mg		

Source: USDA

Tips

Chocolate can be used for prevention and cure of different diseases:

- Eating dark chocolate every day reduces the risk of heart disease by one-third.
- Chocolate has an anti-bacterial effect on the mouth and protects against tooth decay.
- When it comes to Coughs, Chocolate Is More Effective than Codeine.
- The smell of chocolate increases theta brain waves, which triggers relaxation.

Sharing is caring!

Percy Spence, a scientist working on WWII radar and weapons projects, happened to be a big fan of chocolate. After spending some time near a formidable device called a magnetron, he noticed the chocolate bar he'd been keeping in his pocket had turned to mush.

He quickly put two and two together and realized magnetrons might be able to heat up food at incredibly fast rates, and voilà, the microwave oven was born.