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Nature of weather across Africa and specifically East Africa has been erratic, defying even the weatherman's predictions. Unseasonable wet or dry weather have been wreaking havoc to carefully drawn work schedules, causing delays to seasonal planting and renovations, destroying tender plants and wasting valuable materials and time. Whilst not all operations in horticulture sector are dictated by the weather and seasons, changes in climate suggest a host of different potential problems. It could mean a need to introduce a different plant variety, it could mean occurrence of new diseases, pests together with severity of the existing ones and of course, the problem of water: too much or too little. Crops, particularly fruit trees and crops of temperate origin, are susceptible to high temperatures, causing flower and premature fruit abortion and reduced yield. For some crops such as tomato, eggplant and pepper prolonged exposures to heat or water have a negative impact. To commercially produced flowers

Coping with the weather

particularly grown under open field conditions, drought or excessive rains, floods and seasonal variations leads to poor flowering, improper floral development and colour besides reduction in flower size and short blooming period.

Many growers have come up with adjustments and cope up strategies which include: crop diversification, irrigation, water management, disaster risk management, insurance, growing drought-tolerant and early-maturing crop varieties, using renewable energy resources such as solar power, harvesting rainwater and cross-breed to produce hardier species.

The most effective way to address climate change is to adopt a communal sustainable development pathway. This should include awareness and educational programmes for the growers, modification of present horticultural practices and greater use of hi-tech greenhouse technology.

New cultivators that are tolerant to high temperature, resistant to pests and diseases, short duration and producing good yield under stress conditions should be planted. Judicious water utilization in form of drip, mist and sprinkler is also a key factor to consider.

There is need for producers to adapt the necessary coping strategies to avoid adverse impacts. This will alleviate the problems associated with erratic weather for tomorrow if not today!

dorothy rwaro

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Naivasha 2010 horticultural show Successful



Naivasha Horticultural Fair 2010 was held on 10th and 11th September at the Naivasha Sports Club.

The event was majorly sponsored by Kenya Commercial Bank. Speaking at the fair, Mr Peter Munyiri, KCB deputy CEO, urged investors in the export industry to use the bank's products to lower their transaction costs. "I urge investors in this sector, including those who do business across borders in the region to take advantage of our presence in East Africa and in Southern Sudan to benefit from low transaction costs," said Mr Munyiri.

The bank said it has already re-designed its products and services to suit the needs and lifestyle of the horticultural industry. "After successfully entrenching our footprint in the region and implementation of our new core banking system, our challenge was geared towards business consolidation and innovation of our products and services," Mr Munyiri said.

Assistant Minister for Agriculture Mr. Kareke Mbiuki, said the government was planning to cut out the area as an economic processing zone as part of its stimulus package to the sector in a bid to help the sector cut down on its cost of production. The horticultural subsector employs about 4.5 million people countrywide directly in production, processing and marketing, while another 3.5 million indirectly through trade and other activities.

More than 180 exhibitors from all over the world exhibited. There was something for everybody, a lot of interesting things: agricultural machinery makers, flower farms, breeders, agrochemical manufacturers, greenhouse makers, motor vehicle manufacturers and many others.

The greenhouse market was a star of attraction in the fair with stands such as that of Amiran, G.Norths and Hortipro attracting high number of visitors due to the high uptake of greenhouse farming among small-scale horticulture growers. "We have seen an increase in terms of green houses structures and the Farmers kit, as from April business has been improving at rate of 10-20%." Said Henry Otara, G.Norths Company.

Organisations such as Export Promotion Council, KEPHIS and others participated at the fair. Kenya Flower Council stand was elegantly decorated by the Flower Vendors with the assistance of Mukungi Floriculture small scale growers from Kinangop.

Preesman, Olij Rozen, Nirp, Oserian, Beutylene, Delbard, Meilland, Ellegard, De Ruiter, and Lake Naivasha Growers' Group among others, exhibited very beautiful flowers.

Other companies: Chrysal Africa, Sygenta, Afapack, Farmchem, Crop Nutrition Lab, Twiga, Betatrad, Chemoquip, Zwapack, Hobra, Dilpack, Equator Apparels, Joshansen, Aquachem, Car & General, Juanco, Osho, Yara, Engineering Supplies, Ocean Agriculture, Rentokil, Murphy, Davis Shirriff, Hardi, Elgon, Organix, Wambui Entreprises, Africa Hydroponics, Koppert Biological, EAPI, BASF, Bayer, Bosman B.v, FMD and many others had trendily stands.

According to the fair's chairman Roddy Benjamin all the money raised will go to local charities in Naivasha.

Not only people had a good day out, found a lot of interesting technologies but also they supported local charities.

syngenta launches two new innovative fungicides for Ornamentals in Nanyuki

Revus® and Chorus®

Kenya's position in the global cut-flower market still remains dominant and growers are seeking more innovative solutions to remain competitive. The market requirements regarding the use of plant protection products continue to be stringent and environmental safety as well as worker safety has been a priority for most growers as they endeavor to compete for shelf space amongst the numerous supermarkets in Europe.

Mt. Kenya region has continued to grow in stature in terms of Flower and Vegetable production. With the increasing importance of this region, Syngenta took the opportunity to launch its two new innovative fungicides, Revus® and Chorus® for the control of Downy Mildew and Botrytis respectively. The well attended event themed, "Grow more with innovative solutions", was held on the 28th of October in the serene environment at a Nanyuki hotel overlooking the beautiful slopes of Mt. Kenya.

As most growers would confess, other than Powdery Mildew, Downy Mildew and Botrytis pose a serious challenge and can lead to enormous yield and quality losses leading to loss in revenue. While managing the two diseases, the forum agreed that Cultural practices incorporating stringent hygiene measures always complements chemical disease control resulting in a more sustainable disease control.

Revus®, a new fungicide from Syngenta is based on the active ingredient Mandipropamid, and is highly active against foliar Oomycete pathogens that cause downy mildew and blight diseases in Ornamental and vegetable crops. In reiterating the product benefits, Mr. Victor Juma, the Marketing Manager for export crops, assured the growers that from the trials conducted both in Kenya and other countries in Europe, Revus® offers a powerful and long lasting disease control due to its unique property of "LOK and FLO". The product is also compatible with Integrated Crop Management Protocols and is safe to beneficial insects such as *Phytoseiulus persimilis*.

In combating Botrytis, Mr. Kennedy Onyango, the Syngenta



Key Accounts Manager, engaged the growers in a discussion on various aspects of managing this dreadful disease that was dubbed the "dirty man's disease" due to its close association with poor hygiene standards in the greenhouses. In providing the unmatched protection against Botrytis Chorus® offers the following benefits; it fits into IPM programs, no taints on leaves, protects new growth due to its systemic activity and is safe to the environment and the workers.

The importance of seed treatment for vegetable crops was also highlighted in the forum by Mr. Juma. He emphasized that early pest and disease control ensures a healthy crop stand and reduces most of the foliar pesticide applications contributing to increased yields and quality produce. Apron Star®, a seed care product from Syngenta, controls early season pests and diseases in French beans, Snow peas, Sugar snaps and Runner beans and growers were quite amazed with the incremental root mass witnessed from plots treated with Apron Star®.

In the wake of numerous complaints coming from growers regarding "fake products" or adulterated products, Mr. Walter Njenga, the Syngenta National Business Manager, cautioned growers against procuring plant protection products from unscrupulous traders who purport to sell them products at a reduced cost. He remarked, "Ensure that the products you buy from your suppliers are not tampered with and the seal is always intact. Also ensure that you dispose of all used pesticide containers to avoid the same being re-used for product adulteration".

Judging from the expressions and the feedback among the growers, it was evident that the meeting was quite a success and Syngenta truly lived to its slogan of "Bringing plant potential to life".



Green Farming

Dutch suppliers and advisors offering their services under the banner of “Green Farming” held a seminar on 13th September 2010 at Hillpark Hotel, Nairobi. The program was introduced by the Green Farming chairman Mr Harm Maters. Presentations were made by the Dutch Agricultural Counsellor, a representative of KEPHIS, Dutch horticultural suppliers and Kenyan growers. The seminar was concluded with a group discussion on

seminar

the development needs of the sector.

During the meeting, the Dutch horticultural supply industry obtained more insight into the specific needs of Kenyan horticulture sector with the aim of strengthening their network amongst growers, horticultural associations and policy makers.

FPEAK C.E.O Mr. Stephen Mbiti (Left) & Green Farming Chairman Mr. Harm Maters during the seminar



Flower growers go green in battle against pests



Flower companies are undertaking mass production of natural predators for use in greenhouses. Some have almost replaced pesticides use in roses.

Flower growers are increasingly using natural predator insects as opposed to chemicals to fight crop diseases in an effort to meet European export market requirements.

The practice, believed to be safer for the environment, workers and consumers, involves the biological control of pests and diseases.

According to farmers in Naivasha thrips, red spider mite, rootknot nematode and leaf miner are the main infestations for which they apply pesticides.

Kenya has led the expansion in floriculture in East Africa in the last 20 years, but Uganda, Tanzania and Ethiopia are rapidly following suit.

Ethiopia has also followed suit in using biological solutions.

“Our farmers are using integrated pest-control management

and our flowers are becoming popular abroad because they are organic,” said Tsegaye Abebe, chairman of the Ethiopian Horticulture Association.

According to analysts, the use of biological pest control allows farmers save on costs otherwise incurred on soil and airborne infestation control, a move that lowers their cost of production.

“Growers are increasingly taking up our beneficial insects as their primary form of pest control. Beneficial insects are harmless to people, plants, and animals. They are born to hunt, capture, and consume pest insects,” said Mr Barnaba Rotich, Commercial Development Manager Dudutech.

Executives in the flower sector reckon that embracing environmentally friendly farming pest control initiatives is one way of protecting the industry from sanctions and ensuring the sector reverts to high profit margins.

Horticultural products are Kenya’s biggest foreign exchange earner, raking in Sh71.6 billion worth exports last year, down from Sh73.7 billion the previous year.

The move comes hot on the heels of the food miles concept that threatened to lock local producers from key markets especially in the EU on grounds that shipments from far-flung areas were contributing to global warming through carbon emissions.

Proponents of this concept argued that to discourage such threats of environmental degradation, all produce brought in through long haulage should be accorded cautionary labels such that buyers ‘skip them’ for locally produced ones.

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ISO 22000 Food Safety Management System

“Farm to Fork” Solution to Global Food Safety Problem

One of the key challenges the food industry had been facing in recent years had been the array of food safety management system standards from which to choose considering that before the publication of ISO 22000, which is now gaining popularity, a plethora of different standards and rules on a global level existed.

WHAT IS ISO 22000?

ISO 22000 is an international standard for managing food safety issues, published by ISO TC 34 in the year 2005. In a nutshell, ISO 22000 is a food safety management system (FSMS) standard. It is a practical FSMS framework for harmonizing various requirements and standards in a single global standard. The users of this standard range from:

- Crop and Livestock producers
- Feed manufacturers
- Food manufacturers
- Transport operators
- Storage operators
- Subcontractors
- Retail outlets and foodservice establishments,
- Suppliers of ingredients and additives,
- Processing and packaging equipment and materials,
- Sanitation chemicals and treatments and
- Other processing and handling aids.

Key Characteristics of ISO 22000

The ISO 22000 international standard focus on the following:

- Usable by all organizations in the food chain (see above).
- Addresses only on a FSMS; QMS are addressed in ISO 9001 International standard.
- Combine the food safety elements offered by Codex
- Offer an auditable standard that could be used as part of third party certification
- Permit food safety control by either the HACCP plan or operational prerequisite programs (OPRP)

This international standard incorporates three requisite components:

1. Prerequisite programs (PRPs)
2. Hazard Analysis and Critical Control Points (HACCP)
3. Requirements for implementation of a management system

“Public sector participation in the development of the ISO 22000 family is also significant,” Former ISO Secretary-General Alan Bryden commented.

PREREQUISITE PROGRAMS

ISO 22000: 2005 recognize that a FSMS must be supported by foundation of PRPs (See Figure 1). The PRPS provide a FSMS a base onto which to stand firm, just like a house that needs a solid foundation to stand and collapses if it lacks one.

PRPs are ‘*practices and conditions needed prior to and during the implementation of HACCP which are essential for food safety*’ (WHO, 1999). In simple terms PRPs are those practices, which are commonly known as Good Manufacturing Practices, or Good Hygiene Practices. They tend to offer solid foundation onto which HACCP is “laid”.

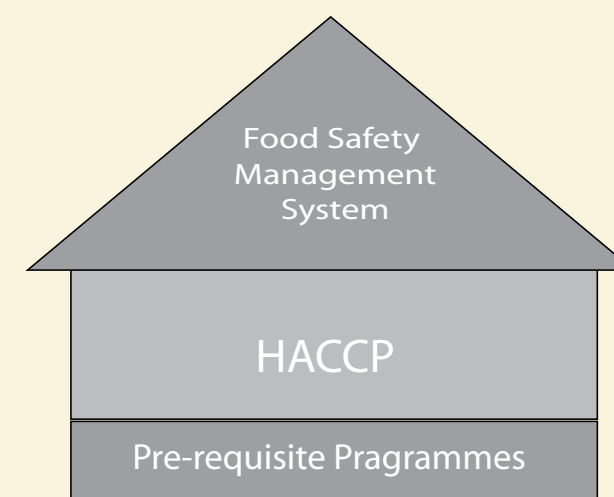


Fig 1: The Food Safety Hut

They control the general processing ‘good house keeping’ issues rather than specific process hazards, which are managed through HACCP. PRPs provide an environment, which is operating to good standards of hygiene and housekeeping. Hence, if well addressed, they tend to reduce the number of CCPs in HACCP.

Prerequisite programs include:

- Good Manufacturing Practices (GMP)
- Good Distribution Practices (GDP)



- Good Hygiene Practices (GHP)
- Good Veterinary Practices(GVP)
- Good Agricultural Practices (GAP) and so on.

HACCP

HACCP is an acronym for Hazard Analysis Critical and Control Points. It is a science based systematic method that serves as a foundation for assuring food safety from “farm to fork”. As a step-by-step method that aims to identify the likely hazards in each stage of food process, you assess if the identified hazard is significant to food safety, and thus determine appropriate preventive control measures to be put in place.

Developed in 1960s as a microbiological food safety system for the US National Aeronautic and Space Administration (NASA), HACCP is now applied to identify chemical and physical hazards affecting product safety. International bodies including UN-World Health Organization and Food and Agricultural Organization promote HACCP system as the most effective method of food safety assurance. Globally, the Codex Alimentarius Commission (Codex) HACCP guidelines is the de facto international HACCP standard. Codex is the internationally recognized food standard-setting body jointly established by the United Nations’ Food and Agriculture Organization (FAO) and World Health Organization (WHO). HACCP, in fact, is one of the first food safety management systems to be widely adopted by food processing operations.

Implementation of a Management System

ISO 22000 is written as a management system standard. The standard addresses policy, planning, implementation and operations, performance assessment, improvement, and management review.

The standard provides a useful model for improving business in the food industry, based on the process approach (as emphasized in ISO 9000), with the management of the food safety risk at its foundation.

Perhaps it is important to note that in actual sense, ISO 22000 was not designed to be a rewording of Codex guidelines for HACCP. In fact, it describes the current state-of-the-art requirements for a food safety management system. Hence, it can be used to develop a food safety management system that exceeds the minimum regulatory requirements.

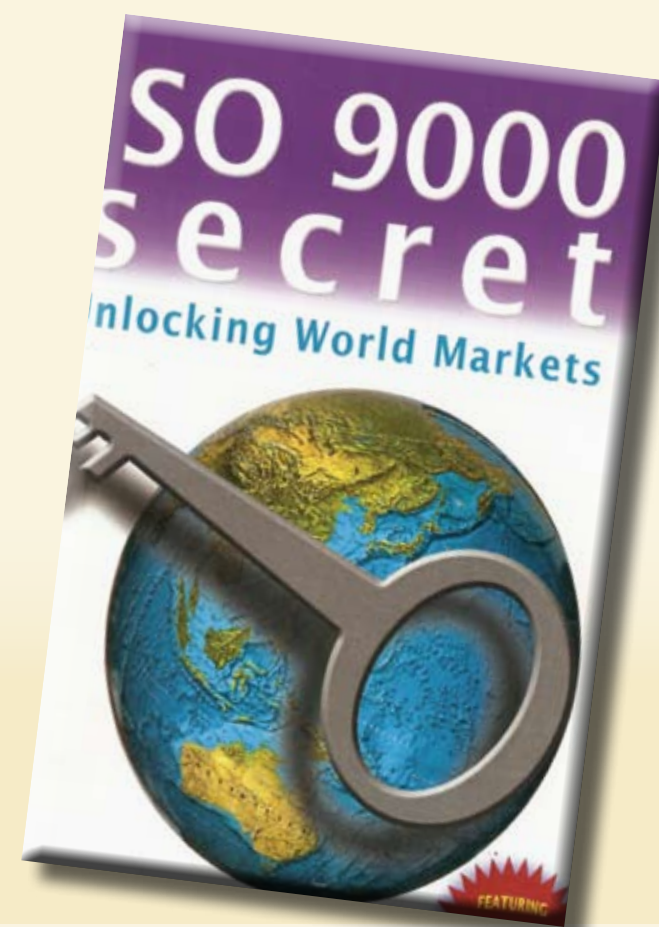
CONCLUSION

In summary, ISO 22000 is meant to provide benefit to food chain through a framework for organizations worldwide to implement the Codex HACCP system for food hygiene in a coordinated way, thus promoting global food trade.

Therefore every food operator in the food chain need to appreciate that ISO 22000 is an important food safety management tool for protecting consumer health and promotion of international food trade.

JULIUS N. MURAGIJRI is the author of ISO 9000 Secret: Unlocking World Markets, a concise guide in implementing quality management systems Based on ISO 9001:2008.

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Solutions To Your Farm Needs

The two-spotted mite, *Tetranychus urticae*, on greenhouse roses

Article by Victor Juma, Syngenta East Africa.

The two-spotted mite, *Tetranychus urticae*, is a major pest of greenhouse roses and has a wide geographic distribution. It is also known informally by many other names such as the 'red spider mite' presumably because of its red colour appearance.

T. urticae is the most polyphagous species of spider mites and has been reported in over 150 host plants of economic value. It is a year-round pest that can cause large economic losses especially under greenhouse conditions due to favourable temperatures and food availability throughout the year. During warm periods of the year, mite populations can reach very high densities causing severe damage. Heavy damage may cause the leaves to dry and drop and the plants may be covered with webbing and may die prematurely. In order to get maximum yield and quality produce it is essential to control mites.

The two spotted-mites can be seen on the underside of leaves where they feed by puncturing cells and draining the contents, producing a characteristic yellow speckling of the leaf surface. They also produce silk webbing which is clearly visible at high infestation levels. At very high infestation levels, reddish-brown masses of mites can be seen hanging from the tips of leaves. When populations of spider mites are high, the entire plant can turn yellow and die and damage symptoms may also appear as shortened internodes and petioles, failure to bloom, and twisted or distorted new growth. Fine webbing and eggs on the undersides of leaves is further evidence of the presence of the mites. The pest can be transferred accidentally to clothing, and spread around the crop by workers.

The life cycle of *T. urticae* is highly influenced by temperature. At temperatures of 28.50C the life cycle has been reported to be as short as 4.22 days while at temperatures of about 13.780C the life cycle is prolonged up to 28.33 days. The life cycle stages include; egg, larva, protonymph, deutonymph and adult. These stages are present throughout the year, depending on the environmental conditions. The Optimal temperatures for the development of *T. urticae* range between 230C– 300C. Females can lay over ten eggs per day and produce over a

hundred eggs during two weeks at about 250C. The sex ratio is highly female biased, with a female to male ratio of about 3:1.

To control the two-spotted mite, an Integrated Management Strategy (IPM) incorporating both chemical and biological control has proved effective and the best results have been achieved when interventions start at low population levels. Thus, growers can utilize predatory mites such as *Phytoseiulus persimilis* combined with other effective IPM-compatible miticides such as Bifenazate and PEGASUS® for effective management. When using predatory mites, growers can afford to tolerate some infestation of the lower layer and allow survival of natural enemies, by spraying only the upper layer. Dividing the rose canopy into production (upper) and maintenance (lower) layers, and developing separate economic damage thresholds for each layer, may offer additional benefits of using 'Knock down' products such as DYNAMEC® on the upper layer when the pest pressure is high while at



Figure 1. Different life cycle stages of the two-spotted mite.



Figure 2. Damage to rose leaves by spider mites

the same time protecting the population of *Phytoseiulus persimilis* on the lower canopy.

When it comes to selecting the appropriate miticides to control the two-spotted spider mite, *Tetranychus urticae* on roses, there is confusion that all miticides are the same in terms of their use patterns, and the range of mite species that they can control. This is not true as many miticides could vary in the target species of mites.

Due to the danger posed by mites, many rose growers have resorted to intensive spraying and this has resulted to the development of resistance to many miticides. It is therefore essential to read the label recommendations and understand the mode of action of different products before application on the crop.



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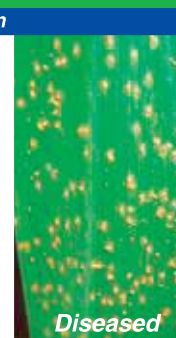
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Jittu Horticulture PLC;

Trials to grow in stonewool

Jittu Horticulture PLC has built 20 hectares of modern greenhouses in Awassa

Worldwide growers use stonewool to successfully produce tomatoes, roses and other plants. Stonewool offers several benefits for growing in East Africa as well, enabling economic and controlled water use and especially as a solution to the nematode problem. Jittu Horticulture PLC is currently looking into the options for using this substrate under local conditions.

Growing in stonewool has become an integral part of modern production in many horticultural companies. It offers big benefits, for instance, the facility to adjust water and fertilisers much more accurately to plant needs.

Drain water can also be re-used, resulting in considerable savings of both water and fertilisers. Stonewool also allows for better control of the root system with regard to pH, oxygen, temperature and disease pathogens. Finally, stonewool is sterile, and there is no need to disinfect the ground. This means less work and also a reduction in chemical agent use. With crops easier to control in stonewool, production is more uniform and of better quality.

But there is no experience of growing in stonewool in East Africa yet. Together with a stonewool supplier, vegetable grower Jittu Horticulture PLC has now started a trial, testing an adapted crop system with stonewool on some 2500 m2. Dutch expert advisers are partnering in this field trial. Simultaneously, solutions to re-use stonewool as a base material are being developed.

With farms in Holeta, Debre Zeit, Koka and Awassa, Jittu Horticulture PLC is one of the largest vegetable growers in Ethiopia. The company was founded in 2006 and now produces several hundreds



Jittu Horticulture PLC grows several hundred hectares of vegetables & fruit

of hectares of vegetables and fruit, grown both in the open field and in greenhouses. Some 46 different types of products are grown for export, amongst others to the United Emirates and Saudi-Arabia. The stonewool trial is run in Awassa. In Awassa Jittu has twenty hectares of modern greenhouses growing tomatoes, peppers, aubergines, cucumbers and peppers.

Manager Jan Prins says: "We would like to be just as efficient in Ethiopia as growers are in The Netherlands. We also strive to supply top quality, and therefore work with Dutch varieties and technology, for instance growing tomatoes on high wires. Another vital consideration is to use water and fertilisers as economically as possible. Stonewool makes this possible."

Stonewool substrates can offer a solution for the nematode problem

The most important reason for growing away from the soil however is the big problem with nematodes. Prins: "We have nematodes galore here. You therefore have to disinfect the ground by treating it with steam or with pesticides. Steaming is very labour-intensive and we don't really want chemicals in the environment. Besides, you cannot always get the pesticides in Ethiopia either."

The stonewool trial is run in a tomato greenhouse. "We start growing tomatoes in stonewool, but I think that we will eventually grow all vegetables out of the soil," says Prins. "We are developing crop systems suited for African conditions. In our trial, stonewool is therefore placed on the ground. We are draining to a central gutter between rows, catching drainwater for recirculation."

This system is quite different from the Dutch method, where stonewool is placed in hanging gutters. "For Ethiopia, this is too expensive, and not necessary either, as we have enough labour here," explains the crop manager. The trial is closely monitored by a crop advisor.

He will undertake weekly plant measurements and collect all harvest data, too. A comparison will be made with a plot with cultivation in the soil. All data will then be analysed in a management program by DLV Plant. "I expect much from this trial," concludes Prins. "I learn something every day, and the support provided by the experts is very useful, that is why we have chosen for the experience of Bosman Engineering and Hoogendoorn growth Management for the delivery and installation of this irrigation and automation project; also because they have their own (service) office here in Ethiopia!"

European Crop Protection Standards



The EU crop protection industry is the most highly regulated sector of the chemical industry; public health and environmental safety are at its heart. European farmer's effective crop protection tools enable them to produce quantity, safe, high quality and affordable food.

Mr. Dominic Dyer, Chief Executive of the UK Crop Protection Association, addressing an audience of over 300 industry experts and policy makers from across Europe in the month of September, warned that the crop protection industry could not afford to take its eye off the ball in maintaining public confidence in the safe and sustainable use of pesticides.

"As an industry we have made enormous progress over the past decade, in areas such as spray equipment testing and maintenance, application technology, sprayer operator exposure and residue reduction management," said Mr Dyer.

"However as we look to the future and the implementation of the EU Sustainable Use and Water Framework Directives, we must continue to focus industry resources and expertise on tackling key issues such as water quality standards and biodiversity protection".

"We can be proud of our achievements and the wider public good we contribute to society, but we must also ensure that that we continue to set the highest possible stewardship standards for our products across the agriculture, amenity and garden sectors," said Mr Dyer.

A Sustainable Use Directive (SUD) came into force on 25th November 2009 and is structured to compliment the new Plant Protection Regulation EC/1107/2009. The Sustainable Use Directive aims to reduce the dependence on pesticide use through the promotion of Integrated Pest Management.

Since the introduction of Directive 91/414, a large number of new bio-control products have entered the market however, from a growers perspective, moving from well known chemistry to entirely new bio control technology can be a nerve wracking prospect. Under the provision of the SUD, laws must come into force by November 2011.

Strengthening the skills of producer organizations and the establishment of fair competition between European products and imported products are two hot topics. At a Conference on the Future of the PAC after 2013, held in late July, the need for greater concentration of supply through producer organizations and the strengthening of its powers, based on the model of fruit and vegetables, was discussed, as well as other aspects.

A large number of participants at this Conference also made a request in relation to the application of products imported into the EU to be of the same standards as applied in the European production, without which the conditions of competition will get distorted.



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Umande

Rainwater Harvesting Project

By GHARP/KRA Secretariat

The semi-arid region north of Mount Kenya has been experiencing the impacts of climate change related to recurring droughts and leading to environmental degradation; declining water resources; food insecurity; and diminishing sources of household income. Kenya Rainwater Association (KRA) and the Umande community formulated a community-based project to mitigate the impacts of climate change on their livelihoods and environment.

In their efforts to address the problem, affected community members in the area formed the Umande Rainwater Harvesting Project (URWHP) to mobilise resources, both internally and from external support agencies. This is a community-based organisation (CBO) comprising 48 individual self-help groups from across Daiga and Ontulili divisions, in Laikipia East. URWHP approached GHARP/KRA Secretariat for assistance in proposal development to address the main impact of climate change – diminishing water resources – through increasing their community capacity to harvest, store, and manage rainwater for productive uses.

With the support of the UNDP Global Environment Facility/Small Grants Programme (GEF/SGP), KRA is currently implementing a community-based catchment approach to climate change mitigation – the project will last for 15 months. This project aims to expand on the on-going European Union (EU)/Skillshare



(Left)
Farm pond, lined and filled with water, waiting the roofing stage, Laikipia West district. Source: GHARP/KRA

(Right) Completed farm pond, Laikipia West district. Source: GHARP/KRA.

International/GHARP/KRA project on integrated rainwater harvesting and management (RHM) systems and complementary technologies

The project is addressing climate change mitigation measures within the Ontulili and Sirimon river sub-basins. It aims to build the capacity of the Umande community to mitigate the impacts of climate change through the introduction of 'green energy' for pumping and purifying water; on-farm micro-irrigation systems (farm ponds and drip irrigation systems) for diversifying crop production and increasing household incomes, seedling production, and tree planting; and promotion of energy-efficient cook stoves. The technological package incorporates capacity building; improved land and water management; renewable energy; environmental conservation; and sustainable livelihood systems – based on RHM and complementary technologies.

One of the major project components is the construction of the 32 farm ponds, which can store 50,000 - 72,000 litres of water each during the wet season - this can then be utilised efficiently during the dry periods to irrigate vegetables and increase crop yield.

KRA have designed the ponds carefully to ensure they are lined to prevent seepage; they are roofed to prevent contamination, evaporation, and risk of children and small animals drowning; and the water is filtered before entering the pond to ensure cleaner water. The ponds collect water from surface water runoff and from the roof guttering.

KRA favours the use of A Plus Ltd dam-liners to line their farm ponds and they have been using them with great success for

the last seven years. The liners are ultraviolet-resistant so they are not destroyed by direct sunlight. They are strong and robust so they prevent seepage of water from the pond into the ground below. The cost is affordable for the community members and GHARP/KRA at Ksh.260 per m² after VAT exemption by the Kenya Revenue Authority GHARP/KRA also receives a discount of five percent and the liners are guaranteed for more than ten years.

Once water is collected in the pond, a farmer can use a low-head drip irrigation bucket kit to ensure that crops are watered in the most efficient manner. Drip irrigation is a micro-irrigation method where low-pressure water is allowed to drip slowly into the root-zone through emitters spaced at pre-determined intervals (e.g. 15, 30, 45 and 60 cm) depending on crops spacing requirement. For low-head drip irrigation systems, water pressure is created by raising the supply container (e.g. bucket, jerrican, and tank) between 0.5 - 1.5 m or connecting the drip system to a pressured water supply. Drip irrigation is the most efficient method of irrigating, because the water soaks into the soil before it can evaporate.

Community members have high hopes for their farm ponds and hope that they will contribute towards becoming self-sustaining and able to increase their vegetable productivity. Purity Wangoi has lived in Daiga division for many years with her husband and three children. She benefited from a GHARP/KRA farm pond in 2009 under the EU/Skillshare project. Before the project, her land was very dry but since the construction of the pond the family has seen a vast improvement.

'Since the farm pond, we have grown many more potatoes which the locals buy. The yield is much better and we have plans to expand in future.' Wangoi's husband, described the impact of the farm pond

The community excitement and expectations were captured by the URWHP Committee Secretary, Mr. Charles Kuira who said: 'People are very eager for



(Top) Vegetable garden under low-head drip irrigation system, Laikipia West district. Source: GHARP/KRA.



(Bottom) Purity Wangoi stands in her Shamba with her daughter Miriam, Daiga Division, Laikipia East district. Source: GHARP/KRA.



Farm pond, lined with ultra-violet plastic lining supplied by A-Plus Limited, Laikipia West district. Source: GHARP/KRA.



Some of the URWHP committee during a monitoring visit by GHARP/KRA Secretariat staff. Source: GHARP/KRA

the new farm ponds] and they are very happy because now the problem of water will be greatly reduced.'

They are already aware of the anticipated project benefits and impacts. One of the farmers, Mr. Gikandi indicated: 'I had lost hope in farming because of the persistent drought that destroyed my crops before maturity...thanks to KRA and Almighty God because I will not need to rely on food relief anymore.'

For more information contact GHARP/KRA, email: gharp@wananchi.com or website: www.gharainwater.org. Become a fan on Facebook: www.facebook.com/GHARP.water and follow our updates on Twitter: <http://twitter.com/GHARP.rainwater>.

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Diagnosis and Control of Plant Diseases

By Joseph Muli (Bsc. Hons)



Someone who has a plant problem asks two questions: What is the problem, and how do I correct it? These are hard questions for beginners and experts alike. Diagnosis is the process of determining the cause of a problem. It can be a long or short process depending on one's ability and the nature of the problem. Once the cause is known, an appropriate control strategy can be developed.

Disease Diagnosis

Plant pathologists take many different approaches to diagnosing plant disease problems. The first step is to decide whether the problem is a plant disease. The broadest definition of plant disease includes anything that adversely affects plant health. This definition can include such factors as nutrient deficiencies, lawnmower damage, air pollution, and pathogens. A stricter definition usually includes a persistent irritation resulting in plant damage. This excludes mechanical damage such as lawnmower injury to trees or natural events such as hail or lightning. A very strict definition includes only those (living) things that replicate themselves and spread to adjacent plants. This includes such biological organisms as nematodes, fungi, bacteria, and viruses. Plants damaged by macroscopic organisms, such as deer, rodents, and birds usually are not considered to be diseased.

Many novices use the picture-book method of diagnosis: looking at textbook pictures of problems and attempting to match the problem with the picture. "The Ortho Problem Solver" and the APS Plant Disease Compendia series are examples of texts that have many useful, high-quality color pictures. Although this method is useful for simple and common problems, it is usually inefficient and inaccurate for more complex or difficult problems.

Another simple technique, used by "The Ortho Problem Solver," is the checklist. Through a series of 70 questions, a person builds a case history of the problem. The questions include the kind, age, and size of the plant. The plant's

location, location of the property, and relationship to other plants also are part of the checklist. Information on the recent weather and soil conditions, soil coverings, and recent care also are needed. Describing the overall condition of the plant is very important.

Symptoms and signs are used to diagnose the condition of a plant. Symptoms are the physical characteristics of disease expressed by the plant. Symptoms can include wilt, galls, cankers, rots, necrosis, chlorosis, and general decline. Definitions of these can be found in the glossary. Signs are physical evidence of the pathogen causing the disease. Signs can include fungal fruiting bodies (such as mushrooms or pycnidia), mycelia, bacterial slime, presence of nematodes or insects, or the presence of insect holes accompanied by sawdust or frass. Again, these terms are defined in the glossary.

The checklist approach is a good guide for the types of questions to ask, but not all the questions are necessary. Some pertain only to certain situations or plants. Other approaches to disease diagnosis attempt to narrow the possibilities with each question and are like synoptic or dichotomous keys.

The diagnostic keys differ depending on the author. Some keys start by identifying the part of the plant that is affected. Is it the whole plant, or just the leaves, branches, stems, or roots? Some refine the first questions to stages of the plant; for example, are the seedlings, flowers, fruit, or seed

affected? Some diseases affect only certain portions of a plant. Many other references start out with the plant itself: is it a fruit tree, foliage plant, or zinnia? Only a limited number of diseases attack a given plant species.

There is no one key set of questions or techniques for diagnosing plant diseases.

Experience and practice are the best teachers. It is easier to diagnose plant problems by making a personal, on-site inspection. Subtle influences of the site, plant environment, and possible management practices can be seen that may have been overlooked by the grower. Difficulties arise when the diagnostician is presented only a portion of the plant because that portion may or may not indicate the real problem. The worst situation is a request for a diagnosis by phone, because misunderstandings and an inaccurate diagnosis can easily occur. However, sometimes this is the only contact someone may have with a diagnostician.

The Systematic Approach

To organize your approach to a plant disease problem, the Systematic approach to diagnosing plant damage by J. L. Green, O. Maloy, and J. Capizzi is useful and is presented briefly here. It consists of a detailed handout, a study guide, and a color slide set. It is designed as a master gardener seminar and is useful to hear or to present you.

The approach involves defining the real problem and distinguishing between living and nonliving causes of plant damage by looking for patterns, determining the development of the damage, and building a case history of the problem. With these steps, it is usually easy to narrow the possibilities and to turn to appropriate reference materials including textbooks, herbarium samples, and knowledgeable specialists.

Define the Real Problem

Identify the plant and what it should look like at this time of year. A grower or gardener may mistake a normal stage of development for a diseased plant. Describe the abnormality in terms of symptoms and signs. Although a plant may



exhibit symptoms of wilting, the real problem may be due to rotted roots, a girdled trunk, or lack of water. Determine what part(s) of the plant is/are affected. The rest of the procedure involves distinguishing between living and nonliving factors.

Look for Uniform or Non-uniform Patterns

Uniform damage is indicative of nonliving factors. Damage may occur on many plant species in the same area, on all the plants in a particular row or block, on all the leaves or shoots on one side of the plant, or on the same-age portion of each leaf or needle. Non-uniform damage to plants is indicative of living factors such as pathogens or insects. This damage shows up as scattered affected plants among a community of plants, scattered leaves or shoots on a single plant, or scattered spots on a single leaf.

Determine the Time Development of the Damage

If damage does not spread or there is a clear line of demarcation between damaged and non-damaged tissues, this is indicative of nonliving factors. Spread of the damage from plant to plant or to other plant parts over time indicates damage by a living organism.

Look for Specific Symptoms and Signs

Look for signs such as fungal fruiting bodies, mycelial threads, bacterial slime, and presence of insects, mites, or holes with frass. Look for (or ask questions about) symptoms of nonliving factors that may be caused by

extremes of temperature, light, or water. Ask about mechanical factors or chemical factors as indicated by uniform patterns. Check references for probable diseases of the identified plant. You may have to send the sample to an appropriate laboratory to continue to identify possibilities.

Once you have determined that a real problem exists and is caused by a living organism, you need to decide what type of organism may be causing the damage. There are many fungal and viral diseases of plants and a few caused by bacteria and nematodes. Some insect problems can mimic diseases; however, this next discussion will focus only on pathogens.

An article entitled "Preliminary Diagnosis of Plant Diseases by Visual Symptoms" by C. Leach is useful and is briefly



described here. This discussion focuses on biological causes; however, many physical factors such as extremes in environment also are discussed in the article.

Begin by establishing which plant part or growth stage is showing symptoms. Are symptoms showing on roots, tubers, bulbs, corms, seedling, foliage, stem, branches, trunks, flowers, fruit, or on the entire plant? Often, you must next decide whether the symptoms are on the outside of the plant or whether you need to cut into it to see the symptoms.

The writer is a Technical expert on Crop Protection in the East African farming Industry. He has over 10 years experience on Crop Protection and Seed business management and could be contacted via email – jkmuli@live.com



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Short Chillies (bullet chillies)



At Mboga tuu, the cultivated variety for short chillies is freshno. Seeds are procured from seed dealers. The seed are propagated and germinated in trays by a contracted propagator. After 4 weeks the seeds are ready for transplanting.

Chili pepper is the fruit of plants from the genus Capsicum, members of the nightshade family, Solanaceae. Chili peppers have been a part of the human diet in the Americas since at least 7500 BC. There is archaeological evidence at sites located in southwestern Ecuador that chili peppers were domesticated more than 6000 years ago, and is one of the first cultivated crops in the Americas that is self-pollinating.

Chilies are used as food, for medicinal purposes, in defense as an irritant and also for pest control.

Red chilis contain high amounts of vitamin C and carotene (provitamin A). Yellow and especially green chilis (which are essentially unripe fruit) contain a considerably lower amount of both substances. In addition, peppers are a good source of most B vitamins, and vitamin B6 in particular. They are very high in potassium, magnesium, and iron. Their high vitamin C content can also substantially increase the uptake of non-heme iron from other ingredients in a meal, such as beans and grains.

A suitable site is selected for land preparation. The land should have deep and well drained soils. On the growing

sites, land that was earlier used to grow crops of the same family like egg plants is avoided. That's why at Mboga Tuu, annual crop rotation plan is very elaborate.

Manure is spread on the selected site and land cultivated using a mould-board plough. The land is allowed to rest for a few days then rotavated to a fine tilth. Beds are then raised at 1.2m apart.

Drip lines are laid on the beds in readiness for transplanting. Seedlings from the nursery are planted at 30cm apart, two rows per bed.

Water is applied regularly on the newly transplanted seedlings up to maturity. 60m3 of water is applied per hectare every two days during the dry days. No water is applied during the rainy season. Critical periods of water requirement are at flowering and fruiting.

At transplanting a rich source of phosphorous is applied- Mono- Ammonium Phosphate or polyfeed (NPK 19:19:19) a table spoonful per plant. This enhances root development therefore quick take-off for the seedlings. Two weeks later Calcium Ammonium Nitrate together with NPK 17:17:17 is applied as a top-dress. Potassium nitrate, calcium nitrate and magnesium nitrate are applied during flowering and fruit formation. Calcium is a key element for chillies and regular application is done. Micro-elements are also provided regularly through foliar application. Chillies require regular feeding to sustain adequate yields for a long time. This is very key as the crop is a heavy feeder.

Weeds offer competition to the growing crops and also harbour pests and diseases. The fields should be kept clean for healthy and disease free crops. Regular weeding depending on the weed pressure is done. No herbicides are currently being used in

Mboga Tuu farms for weeding purposes.

Short chillies do not normally require support; however some plants with weak stems may require support to enable them carry the weight of the fruits. Mere examination/ observation of the plants can tell the need for support. Like in our newly planted shade houses and tunnels, the need for support is inevitable. This is done by running a wire through the erected poles on the edges of the beds so that no crop falls on the walk ways.

Within 5 weeks from transplanting the chillies start flowering. This is a critical stage in terms of irrigation, feeding and pest control as this will determine fruit set. Insect pest damage may cause flower bud abortion. Trace elements that aid in fertilization are necessary at this stage of crop growth.

First fruits are harvested 8 weeks from the date of transplanting. Fruits are harvested green by picking them and detaching them from the plant with the fruit stalk attached. The maturity index is a full bodied fruit which is green in colour. Immature fruits are hollow inside and improperly formed. The fruits are harvested daily collected in crates. They are kept in cool shades. They are sorted and later are transported to the pack house where packing is done. They are shipped to the customer on the same day.



Pests and Diseases

Thrips

This is a major pest for chillies attacking the flowers. They hide in un-open flower buds and sucks sap from the young developing fruits. They can cause the flower to abort or cause permanent damage to the developing fruit. Even before flowering, the said pest can attack the young growing shoots which tend to curl which is a serious manifestation of the attack. They are controlled using insecticides such as: spinosad, imidachlopid and synthetic pyrethroids.

White flies

These are white colored insects which hide on the underside of the leaves. They suck sap from the plant leaves and excrete honey dew on the leaf surface. They are also responsible for the transmission of viral diseases such as the tobacco mosaic virus and tomato yellow leaf curl virus. White flies are controlled with insecticides such as: imidachlopid, buprofenzin and thiomathaxam.

Powdery Mildew

This is a very common disease of the short chillies. It is characterized by white mycelia on the underside of the leaf. The leaves soon turn yellow and are shed off. This disease is controlled by use of fungicides including: sulphur, bupirimate, tebuconazole and difenoconazole.



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SOIL PHYSICAL CHARACTERISTICS:

Bulky Density and Soil Temperature

By Francis Mambala, AgriQ

The last two issues focused on soil colour and soil pore space. This second part will dwell on bulky density, as well as soil temperature and attempt to advice farmers on the suitable practices that can lead to high productivity based on these characteristics. This is particularly important for soils that need amending.

Bulk Density

Bulk density is the mass of a unit volume of dry soil. The volume includes both solids and pores hence referred to as bulk volume. The density of solids alone is called particle density. Soils with more pore space compared to solids have lower bulk densities compared to compact soils.

Factors that will influence pore space (aeration) will also affect bulk density. The fine textured soils tend to be organized in porous grains especially where organic matter is sufficient. On the other hand, particles in sandy soils are close together due to reduced organic matter leading to higher bulk densities (see table below). Texture and structure of a soil, its total pore space and organic matter content are all related to bulk densities.

General relationship among texture, bulk density and porosity of soils

The unit Mg/m³ refers to Megagram per cubic metre, and since 1 Mg = 1 000 000g while 1m³ = 1 000 000cm³ then the unit can also be expressed as g/cm³

Textural Class	Bulk Density (Mg/m ³)	Porosity (%)
Sand	1.55	42
Sandy loam	1.40	48
Fine sandy loam	1.30	51
Loam	1.20	55
Silt loam	1.15	56
Clay loam	1.10	59
Clay	1.05	60
Aggregated clay	1.00	62

The relevance of bulk density to horticultural productivity is its influence on the physical conditions of a soil. Generally soils with low bulk density have better physical condition than those with higher bulk densities. Farmers who carry out soil analysis and get fertilizer recommendations are aware of fertilizer rates normally given. The computations are made based on bulk density, this means that clay soil having the same deficiency level of a given nutrient say nitrogen will receive less fertilizer than a sandy soil. It is important for horticulture farmers to have their soils tested regularly (quarterly is recommended) for amendment (if need be) and fertilization purposes. Modern farming should be precise and not a matter of trial and error.

Soil Temperature

Soil temperature along with soil moisture control biological processes for nutrient transformations and nutrient availability. Indeed, soil micro-organisms which are involved in these processes normally show maximum growth and activity at soil temperature range of 270 to 320C. Soil temperature has great influence on seed germination, root and shoot growth, nutrient uptake, as well as growth and development of crops. For example, most horticultural seeds will not germinate below 50C or above 350C.

All crops practically slow down their growth below the temperature of about 90C and above the temperature of about 500 C. This presents challenges that differ from place to place and season to season. Farmers located in the generally cold highlands are compelled to carry out practices that meant to raise soil temperatures while those in hot areas have to try and cool the temperatures.

Some of the main factors that control soil temperature and which can easily be used by farmers to great effect are soil colour, vegetative cover and soil moisture. Dark soils absorbs more energy from the sun than light coloured soils while red or yellow soils show a more rapid temperature rise than those that are white. Soil cover affects the amount of insolation that is received. Bare soils will warm more quickly and cool faster than those covered with vegetation or mulches, therefore farmers are generally encouraged to practice mulching.

Soil moisture affects heat capacity of a soil. The low temperature of a wet soil is due partially to evaporation and partially to high specific heat. Drained and undrained soils in different areas will show maximum differences in soil temperature. It follows that irrigation regimes can be used to regulate soil temperatures as need arises.

Knowing the soil temperature is imperative when battling pests and diseases. Since certain pests thrive in certain soil temperatures, having that information can greatly help a horticultural farmer to manage pests and diseases without having to use too much of the environment unfriendly pesticides. Indeed it is one aspect of Integrated Pest Management (IPM) that 'enlightened' farmers have used successfully.



Food is Killing Us More than AIDS

According to WHO, four of the most prominent non-communicable diseases (NCD's) – cardiovascular disease, cancer, chronic respiratory disease and diabetes – share preventable risk factors related to lifestyles. These factors are tobacco use, unhealthy diet, physical inactivity and the harmful use of alcohol. To prevent cancer, the U.S. National Cancer Institute says: First stop smoking.

The American Heart Association recommend that for heart disease and stroke prevention, fruits, vegetables, grains and fish can assist greatly. Eating variety of fruits and vegetables help you control your weight and lower your blood pressure. Whole-grain foods contain vitamins, minerals, fiber, lipids and sterols that lower your blood cholesterol that may help you manage your weight. Eating oily fish that contains omega-3 fatty acids (from e.g. sardines, tilapia, Nile-perch, salmon, trout, catfish, etc.) may help lower your risk of death from coronary heart disease.

Fruits, vegetables, and whole-grains contain a number of nutrients including carotenoids (found in spinach, tomatoes, red pepper, carrots, strawberries, among others), which are known to prevent a variety of cancers.

For many years, nutritionists have been advocating on that, diet and lifestyle changes is more effective than drugs in fighting diabetes. In a recent edition of the Lancet magazine (a respected health magazine), it says, "Because Type 2 diabetes is largely rooted in reversible social and lifestyle factors, a medical approach alone is unlikely to be a solution," it concluded. "To lessen the burden of diabetes requires a substantial change in diet and routine... The fact that Type 2 diabetes, a largely preventable disorder, has reached epidemic proportions is a public health humiliation.

A joint 4-yr (2004-2008) partnership of the World Diabetes Foundation, Ministry of Health and the Kenya Diabetes Management & Information Centre (DMI Centre) found that prevalence in Kenya estimated at 6-10% and rising quickly. According to the partnership, prevention is a better option than cure. Nutrition is the key element in the management, prevention and control of diabetes.

There are many risk factors for type 2 diabetes. They include: obesity and overweight, lack of exercise, previously identified glucose intolerance, unhealthy diet, increased age, high blood pressure and high cholesterol, family history of diabetes, etc.

To prevent diabetes and indeed cancer, chronic respiratory disease and heart conditions people should eat lots of different types of vegetables and fruits, prefer whole-grain unrefined foods over processed grain products, exercise (at least 45 minutes of sweat-producing activity daily) and eat fish at least 3 times a week.



Nutrition is the foundation of good health. Poor nutrition gives you poor health and greater disease. Good nutrition gives you good health and less disease.

It is now universally recognized that the type of western diet eaten by most people these days is high saturated with animal fat and cholesterol, salt, sugar and refined carbohydrates. It is low in fibre, essential amino acids, vitamins and minerals. This has serious implications in the development of serious medical conditions, indeed life-threatening. This type of diet is based on an over-consumption of meat, dairy products and highly processed foods. The effects are aggravated further by lack of exercise, excess consumption of alcohol and smoking.



These meal types are sufficiently lacking in essential nutrients such as vitamins and minerals found in fruits and vegetables. These foods are indeed unhealthy if not eaten in a balanced manner and can increase your risk of getting cancer, coronary heart disease, obesity and your body's overall ability to fight disease. The food you choose to eat has a very big impact on your general health, your chances of developing disease and your body's ability to fight already contracted disease.

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A blind boy sat on the steps of a building with a hat by his feet. He held up a sign which said: "I am blind, please help." There were only a few coins in the hat.

A man was walking by. He took a few coins from his pocket and dropped them into the hat. He then took the sign, turned it around, and wrote some words. He put the sign back so that everyone who walked by would see the new words.

Soon the hat began to fill up. A lot more people were giving money to the blind boy. That afternoon the man who had changed the sign came to see how things were. The boy recognized his footsteps and asked, "Were you the one who changed my sign this morning? What did you write?"

The man said, "I only wrote the truth. I said what you said but in a different way." I wrote: "Today is a beautiful day but I cannot see it."

Both signs told people that the boy was blind. But the first sign simply said the boy was blind. The second sign told people that they were so blessed that they were not blind. Should we be surprised that the second sign was more effective?

Moral of the Story: Be thankful for what you have. Be creative. Be innovative. Think differently and positively. Cultivate an attitude of gratitude.

Rather than focus upon the thorns of life, smell the roses and count your blessings!



VALUE WHAT IS YOURS!

The owner of a small business, a friend of the poet olavo bilac, met him on the street and asked him "Mr. Bilac, i need to sell my small farm the one you know so well. Could you please write an announcement for me for the paper?"

Bilac wrote

"FOR SALE, A BEAUTIFUL PROPERTY, WHERE BIRDS SING AT DAWN IN EXTENSIVE WOODLAND, BISECTED BY THE BRILLIANT AND SPARKLING WATERS OF A LARGE STREAM. THE HOUSE IS BATHED BY THE RISING SUN. IT OFFERS TRANQUIL SHADE IN THE EVENINGS ON THE VERANDA".

Some time later, the poet met his friend and asked whether he had sold the property?

To which he replied: i've changed my mind. When i read what you had written, i realized the treasure that was mine.

Sometimes we underestimate the good things we have, chasing after the mirages of false treasures. We often see people letting go of their children, their families, their spouses, their friends, their profession, their knowledge - accumulated over many years, their good health, the good things in life.

They throw out of the window what god has given them, so freely; things which were nourished with so much care and effort . VALUE WHAT IS YOURS!

Seeing yourself as you want to be

is the key to personal growth."



"We should trust people in making their own decisions. People do make the good choices when they have the right information. More transparency is definitely something we need in the real life." Dr Gudmundsson"

"Intelligence is the flower of discrimination.

It Matters Not What You Do with What You have, But it is what You Make of What You Have that Counts.

Albert Einstein considered this to be the best formula for success:

"If a is success in life, I should say the formula is a equals x plus y plus z, x being work and y being play."

"And what is z?" inquired the interviewer. "That," Einstein answered, "is keeping your mouth shut."

William Jennings Bryan said, "Never be afraid to stand with the minority which is right, for the minority which is right will one day be the majority; always be afraid to stand with the majority which is wrong, for the majority which is wrong will one day be the minority."