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Global Journal of Advanced Biotechnology and Biochemistry Research

Aims and Scope

Global Journal of Advanced Biotechnology & Biochemistry Research is a research journal, which publishes top-level work from all areas related to Biotechnology & Biochemistry. It covers from molecular biology and the chemistry of biological process to aquatic and earth environmental aspects, as well as computational applications, policy and ethical issues directly related to Biotechnology. Molecular biology, genetic engineering, microbial biotechnology, plant biotechnology, animal biotechnology, marine biotechnology, environmental biotechnology, biological processes, industrial applications, bioinformatics, Biochemistry of the living cell, Bioenergetics, Bioenergetics, Inorganic biochemistry, Innovation in biotechnology and bio-ethics, Biotechnology in the developed and developing world, Management and economics of biotechnology, Political and social issues and others are some of the main subjects considered. It aims to disseminate knowledge; provide a learned reference in the field; and establish channels of communication between academic and research experts, policy makers and executives in industry, commerce and investment institutions.

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Contents

Study of Free Radicals and Antioxidants Status in Cardiovascular Health and Disease

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ABSTRACT

Current hypotheses support the idea that bringing down oxidative anxiety can have a medical advantage. Free radicals can be overproduced or the characteristic cell reinforcement framework protections debilitated, first bringing about oxidative anxiety, and after that prompting to oxidative harm and malady. Cardiovascular infection is one case of this procedure. This issue keeps on being the significant reason for unexpected passing around the world. Oxidation of human low-thickness lipoproteins is viewed as an early stride in the movement and inevitable advancement of atherosclerosis, one of the main sources to cardiovascular brokenness. Convincing backing for the contribution of free radicals in sickness advancement starts from epidemiological reviews demonstrating that an upgraded cancer prevention agent status is related with decreased danger of a few ailments. Dietary nutraceuticals, for example, vitamins C, E and polyphenolics and diminishment of cardiovascular malady frequency are an eminent illustration. This paper surveys the science of ROS/RNS, their pathways through which they identify with the pathology of cardiovascular malady and talks about the putative parts that cancer prevention agents, including phenolics, may play in controlling oxidative anxiety and diminish the frequency of cardiovascular illness.

Key Words: Oxidative stress, cardiovascular disease, atherosclerosis, inflammation, cell signaling and transduction mechanisms, antioxidants, dietary phenolics.

1. Overview

Most cardiovascular events are discretionary to atherosclerosis, a disease of the courses including an area thickening of the vessel divider. A stroke or myocardial limited spoil happens when the lumen of the vessel winds up being totally obstructed, overall by a thrombus shaping at the site of a plaque.Atherosclerotic wounds are thought to be begun by relocation of monocytes into the vein internal focus (tunica intima), enlisted by bond particles, possibly in light of vein endothelium damage.An grouping of components have been trapped in bringing on this fundamental mischief, including mechanical damage from stream push declined by hypertension, viral illness (herpes contaminations and cytomegalovirus), introduction to blood borne harms, for instance, xenobiotics from tobacco smoke and lifted levels of common metabolites, for instance, glucose, homocysteine or cholesterol.

2. Basic Concepts Of Free Radicals, Reactive Nitrogen Species, Reactive Oxygen Species And Oxidative Stress:

A free radical is any synthetic species (equipped for autonomous presence) having at least one unpaired electrons, an unpaired electron being one that is separated from everyone else in a nuclear or atomic orbital. Free radicals are framed from atoms through the breakage of a concoction bond with the end goal that each part keeps one electron (free radicals may likewise be shaped by crash of the non-radical species by a response between a radical and a particle - which should then outcome in a radical since the aggregate number of electrons is odd), by cleavage of a radical to give another radical and, at long last by method for redox reactions. Radicals are overall less enduring than non-radical species, regardless of the way that their reactivity changes. Free radicals and responsive oxygen/nitrogen sorts of noteworthiness in living creatures fuse hydroxyl (OH.), superoxide (O_2), nitric oxide (NO.), nitrogen dioxide (NO_2.) and peroxyl (ROO.). Peroxynitrite (OONO-), hypochlorous destructive (HOCl), hydrogen peroxide ($H2O_2$), singlet oxygen (O_2), ozone (O_3), nitrous destructive (HNO_2)and dinitrogen trioxide (N_2O_3) are not free radicals but rather can undoubtedlyprompt to free radical responses in living creatures. The term 'receptive oxygen species' (ROS) and 'responsive nitrogen species' (RNS) is an aggregate term that incorporates the radicals as well as the non-radicals. Oxidative anxiety is the term alluding to the awkwardness between era of responsive oxygen species and the movement of the cell reinforcement protections.

People and different aerobes can endure oxygen (O_2) in light of the fact that, while life forms were advancing electron- transport chains and other chemical frameworks to use this atom, cancer prevention agent resistances to secure against the harmful impacts of O_2were developing in parallel. ROS/RNS can emerge from unintentional era; this incorporates such components as "spillage" of electrons onto O_2 from mitochondrial electron transport chains; atomic film, endoplasmic reticulum (xenobiotic digestion system, prostaglandin combination) and hepatocytes (detoxification) contain electron transport frameworks, cytochrome P-450 and b5, era likewise incorporates the immediate response of autoxidisable atoms with sub- atomic O_2, creating superoxide free radical. The major natural process prompting to O_2-.era is the electron transport related with mitochondrial layer; ubiquinone-cytochrome b is the most imperative site of O_2-creation. It has been evaluated that 1-3% of O_2 inhaled is changed over to O_2 a rate that additions in the midst of times of extended essentialness assimilation framework. O_2in like manner is conveyed by phagocytic cells (neutrophils, monocytes, macrophages, eosinophils) and helps them to inactivate contaminations and tiny living beings. Right when these cells encounter a phagocytable atom, their O_2 usage increases gigantically ('respiratory burst') with the start of a layer discovered protein (NADPH-oxidase) which catalyze the diminishment of O_2 into O_2 –O_2.- appreciate which create free radicals6. Unintentional the making

of to a great degree responsive compound species, for instance, OH., hypochlorite and chloramines (Figure 1).

Unimolecular Radical Reactions

Reactions result from the instability of the first formed radical. The radicals maycompletely decompose or rearrange before reaction with other molecules or radicals present.

Decomposition: reaction in which the radical decomposes to give a stable molecule and a new radical

Rearrangement:

1.Breaking of an adjacent C-C bond in a cyclic system with concomitant formation of anew bond, usually carbonyl and a new isomeric radical

2. Migration of an atom, via intramolecular abstraction by the radical center, thus creating a new, isomeric radical.

Radical-Molecule Interactions

Addition to unsaturated systems:

1. Addition of a radical to an olefinic twofold attaches to give another immersed, radical. Regular response is the radical instigated polymerization of olefins.

2. Addition of a radical to a sweet- smelling twofold bond. This moderate stride is far reaching in free radical science, e.g. in the radical substitution of fragrant mixes (homolytic sweet-smelling substitution). The net general response is dislodging of a sweet- smelling substituent by a radical:

$$AR — X + Y. \rightarrow AR — Y + X.$$

Abstraction or displacement: S_H2 reactions†

– Biomolecular reaction involving homolytic attack of a radical on a molecule. The radical attacks a univalent atom, usually a terminal halogen or hydrogen in an abstraction reaction to give rise to a new radical, e.g.

$$Ph. + CBrCl_3 \rightarrow .CCl_3 + PhBr$$

– Homolytic substitution at multivalent atoms also occurs but both do not normally occur at saturated carbon centers.

Reaction with oxidizing agents

Radicals readily undergo 1-electron oxidations with oxidizing reagents of suitable redox potential to give positive ions. Example is the Meerwein reaction, which involves the oxidation of cinnamyl derived radicals by cupric ions:

$$Ph.CHCHRCO_2Et + Cu^{2+} \rightarrow PhC{+}HCHRCO_2Et + Cu^{+}$$

Radical-Radical Interactions

Dimerization or radical coupling

Localized radicals (methyl, phenyl radicals) react readily with little chance of dimerization. Only delocalized radicals have a high probability of dimerization in solution. Thus,

$$R'. + R''. \rightarrow R'\text{-}R''$$

When R' = R", the reaction is dimerization and when R' ≠ R" the reaction is radical coupling or combination.

Radical disproportionation

Involves collision of the radicals resulting in the abstraction of an atom, usually hydrogen, by one radical from theother. This leads to the formation of two stable molecules, with the atom abstracted being β to the radical center:[‡] e.g. the disproportionation of two phenylethyl radicals to give styrene and ethylbenzene

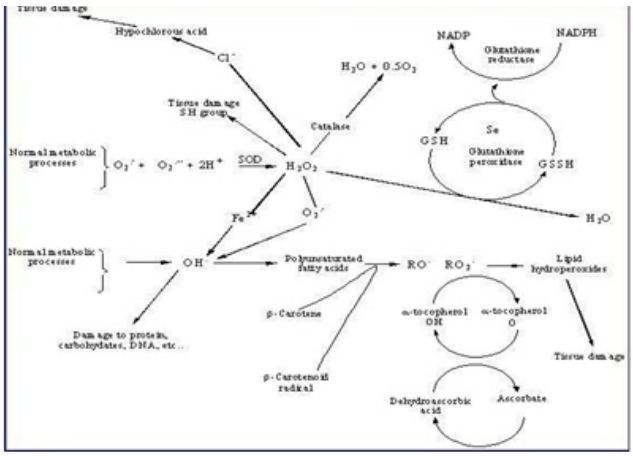

Figure 1: Inter-relationship between reactive oxygen species and antioxidants.

3. Reactive Oxygen Species And The Cardiovascular System:

Receptive oxygen species have been viewed as injurious to cell work and there is great confirmation to propose that they assume a part in the pathophysiology of heart illness states. In any case, coordinate circumstances and end results connections have not been unmistakably portrayed. The expansion in the era of ROS under a few pathophysiological conditions, that appear to be identified with provocative procedures, is still to be exhaustively comprehended; this might be because of challenges in characterizing their site of source. Impeded mitochondrial lessening of atomic oxygen might be an intracellular source. Emissions by phagocytic white platelets, broken endothelial cells, or the auto-oxidation of catecholamine might be the extracellular sources. ROS may likewise come about because of cell harm because of presentation to ionizing radiation, bright beams, cigarette smoking or other air toxins. Other than their harmful impacts, ROS are likewise now being perceived as essential controllers of cell capacity and modulators of cell flagging pathways.

ROS in pathophysiology of Heart disease:

One of the systems used to evaluate the part of oxidative worry in the pathogenesis of heart brokenness has been to uncover confined cardiovascular tissues to a characterized oxidation stretch condition and study the subsequent impacts. Promote in vivo and ex vivo thinks about have given valuable confirmation supporting the part of oxidative worry in various conditions (atherosclerosis, ischemia-reperfusion damage, hypertension, catecholamine-actuated cardiomyopathy, diabetic cardiomyopathy, heart hypertrophy and congestive heart disappointment etc.) prompting to extreme cardiovascular dysfunctions. In this audit the part of ROS in atherosclerosis is being accentuated as, other than being considered as the significant reason for dreariness and mortality 32 its result is additionally connected to different conditions prompting to cardiovascular issue. The part of ROS in other previously mentioned conditions has been widely checked on and is alluded to various phenomenal reports.

Most cardiovascular occasions are optional to atherosclerosis, an infection of the corridors including a nearby thickening of the vessel divider.

A stroke or myocardial dead tissue happens when the lumen of the vessel turns out to be totally blocked, as a rule by a thrombus framing at the site of a plaque. Atherosclerotic injuries are thought to be started by resettlement of monocytes into the blood vessel inward center (tunica intima), selected by attachment particles, perhaps in light of blood vessel endothelium harm. An assortment of elements have been ensnared in bringing about this underlying harm, including mechanical harm from stream stretch compounded by hypertension, viral contamination (herpes infections and cytomegalovirus), presentation to blood- borne poisons, for example, xenobiotics from tobacco smoke and raised levels of typical metabolites, for example, glucose, homocysteine or cholesterol36. In spite of the fact that an

abnormal state of plasma cholesterol is considered to trigger atherosclerosis, the oxidation of cholesterol is by all accounts a fundamental stride. Actually, take-up of oxidized low- thickness lipoprotein (oxLDL) was appeared to be an early occasion prompting to the advancement of atherosclerosis (Figure 2). oxLDL and oxidized lipoproteins have been accounted for to invigorate O_2 development prompting to apoptosis of cells in the umbilical vascular divider; this was avoided by treatment with cancer prevention agents SOD and catalase. In refined human coronary supply route smooth muscle cells, low levels of oxLDL animate the extracellular grid combination demonstrating the contribution of oxidative worry in the pathogenesis of atherosclerosis. Elevated amounts of oxLDL were apoptotic involving the added substance part of ROS in expanded plaque defenselessness; this impact was diminished by probucol and catalase. Patients with atherosclerosis and hypercholesterolemia demonstrated higher helplessness of LDL to oxidation in contrast with patients treated with lipid- bringing down operators, for example, lovastatin and probucol.

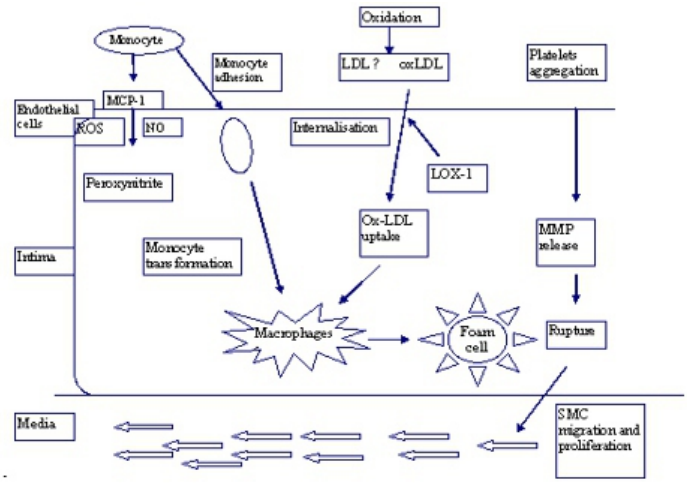

Figure 2: ROS and atherosclerosis: (i) oxidation of LDL to oxLDL; (ii) endothelial cell dysfunction; (iii) vascular smooth muscle cells migration and proliferation as well as MMPs release; (iv) monocyte adhesion and migration as well as foam cell development due to uptake of ox-LDL.

ROS in Mediated Signal Transduction Pathways in Cardiovascular disorders:

The cardiovascular framework is an exceptionally mind boggling, efficient framework in which flag transduction plays basic physiological and pathophysiological parts (Figure 3). The cell components of the heart and vascular divider are furnished with a variety of particular receptors and with complex intracellular hardware that encourages and drives proper reactions to extracellular boosts. All vascular cell sorts, including endothelial cells, smooth muscle cells, adventitial fibroblasts, and occupant macrophages, deliver ROS51-55. Of specific significance in the vasculature are superoxide (O_2) and hydrogen peroxide (H_2O_2), since these ROS go about as between and intra-cell flagging particles. The real wellspring of ROS in the vascular divider is non-phagocytic NADPH oxidase, which is controlled by vasoactive operators (Ang II, ET-1, thrombin, serotonin), cytokines (IL-1, TNFa), development variables (PDGF, IGF-1, VEGF) and mechanical powers (cyclic extend, laminar and oscillatory shear

push). Elevated amounts of low-thickness lipoprotein (LDL), particularly as oxidized low-thickness lipoprotein (bull LDL), have likewise been appeared to increment intracellular ROS era. Under physiological conditions, vascular creation of ROS and the subsequent enactment of redox-ward flagging pathways and enlistment of redox- touchy qualities are firmly controlled. Be that as it may, in obsessive conditions, for example, in hypertension, atherosclerosis, hyperlipidemia, hyperhomo-cysteinemia, and diabetes, where era of ROS is expanded and the renin angiotensin framework might be upregulated, these redox-delicate occasions may add to cell forms required in vascular brokenness and basic renovating.

4. Antioxidants And Their Relevance To Cardiovascular Disease:

A cell reinforcement has been characterized as "any substance that, when present at low focuses contrasted and those of an oxidizable substrate, altogether delays or anticipates oxidation of that substrate"38. Whenever ROS/RNS are created in vivo, their activities arecontradicted by mind boggling and facilitated cancer prevention agent lines of safeguard systems. These incorporate enzymatic and non-enzymatic cancer prevention agents that hold under tight restraints ROS/RNS level and repair oxidative cell harm (Figure 3). The real chemicals, constituting the main line of resistance, straightforwardly required in the balance of ROS/RNS are: superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) (Figure 1). Turf is a cytoplasmic and mitochondrial chemical, which quicken the dismutation of superoxide. There are three types of SOD: an extracellular and an intracellular copper/zinc (Cu/Zn) and a mitochondrial, manganese (Mn) SOD. Every one of the three structures catalyze the dismutation of O_2.- to H_2O_2. Since SOD chemicals produce H_2O_2, they work in a joint effort with H_2O_2-expelling proteins. Feline, an only peroxisomal catalyst in many tissues, changes over H_2O_2 to water and O_2. Be that as it may, the most vital H_2O_2- expelling catalysts are the selenoproteinGPx proteins. GPx chemicals evacuate H_2O_2 by utilizing it to oxidize decreased glutathione (GSH) to oxidized glutathione (GSSG). Glutathione reductase, a flavoprotein compound, recovers GSH from GSSG, with NADPH as a wellspring of diminishing force (Figure 3). Glutathione peroxidase likewise catalyzes the decrease of flimsy hydroperoxides to the detriment of GSH.

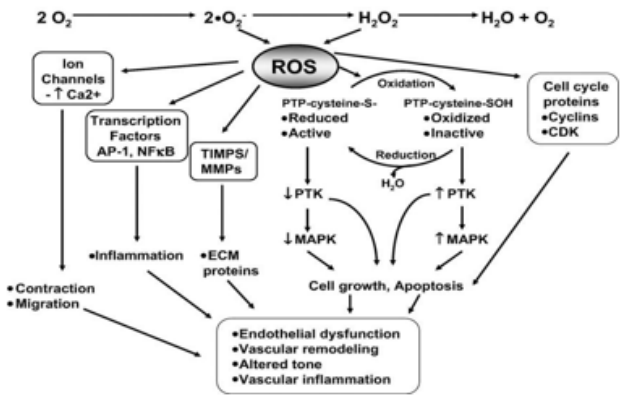

Figure 3: Redox-dependent signaling pathways in vascular smooth muscle cells

The expansion ROS which is delivered from NSDPH oxidase may adjust the action of tyrosine kinases, for example, Src, Ras, JAK2, Pyk2, PI3K, and EGFR, and also mitogen-actuated protein kinases (MAPK), especially p38MAPK, JNK and ERK5. ROS may hinder protein tyrosine phosphatase movement, additionally adding to protein tyrosine kinase initiation. ROS additionally impact quality and protein expression by actuating translation components, for example, NF B activator protein-1 (AP-1) and hypoxia-inducible element 1 (HIF-1). ROS invigorate particle channels, for example, plasma film Ca2+ and K+ channels, prompting to changes in cation focus. Actuation of these redox-touchy pathways brings about various cell reactions which, if uncontrolled, could add to hypertensive vascular harm.

The second line of barrier is spoken to by radical rummaging cancer prevention agents, for example, vitamin C, vitamin An and plant phytochemicals like phenolics (underscored later in this audit) repress the oxidation chain start and avoid chain spread. This may likewise incorporate the end of a chain by the response of two radicals. The repair and anew proteins go about as the third line of guard by repairing harm and reconstituting films. These incorporate lipases, proteases, DNA repair proteins and transferases.

The HMG-CoA reductase inhibitors, otherwise called statins, are intense lipid- changing specialists. There is overpowering proof from clinical reviews that diminishing plasma LDL levels with statins, brings about a particularly bring down danger of cardiovascular occasions identified with atherosclerosis. Late reviews in patients with built up CAD demonstrate that these specialists can bring about an unobtrusive relapse of atherosclerotic sores. It has been recommended that the antiatherosclerotic impact of statins might be autonomous of their LDL-bringing down impact.

5. Conclusion

The ramifications of oxidative worry in the etiology of a few incessant and intense degenerative issue recommends that cell reinforcement treatment speaks to a promising road for treatment. Procedures for the intercession and counteractiveaction of cardiovascular infection require a comprehension of the essential atomic system (s) by prophylactic operators (manufactured cancer prevention agents, dietary cell reinforcement variables from sustenance plants and therapeutic plants) that may possibly anticipate or invert the advancement or movement of the sickness. It stays unequivocal that developing logical support for wellbeing cases and distinguishing proof of dynamic utilitarian fixings should be adjusted by tending to toxicological concerns. The genuine evidence of viability for existing or novel mixes/concentrates ought to exude from a show of clinical adequacy on characterized restorative classifications. In this regard, the result of one such trial led on the Mauritian populace on the impacts of Mauritian dark tea on markers of oxidative anxiety prompting to cardiovascular ailment is as of now abundantly anticipated.

References

1.Moreno JJ, Mitjavila MT. The level of unsaturation of dietary unsaturated fats and the advancement of atherosclerosis
(survey).J NutrBiochem 2003;14:182-195.
2. Central Statistic Office, Mauritius 2005. http://www.gov.mu/entryway/site/n cb/cso
3. Moad G, Solomon DH. The Chemistry of FreeRadical Polymerization. Pergamon Press: Oxford,1995.
4. Perkins MJ. Turn catching. Propels in Physical Organic Chemistry 1980;17:1-64.
5. Bensasson RV, Land EJ, Truscott TG. Energized States and Free Radicals in Biology
6. and Medicine. Commitment from Flash Photolysis and Pulse Radiolysis. Oxford University Press: Oxford 1993.
7. Yu BP. Cell safeguards against harm from responsive oxygen species, Physiol Rev 1994;74:139- 162.
8. Curnutte JT, Babior BM. Constant granulomatous ailment. Adv Human Genetics 1987;16:229-245.
9. Halliwell B, Free radicals and cancer prevention agents: An individual view, Nutr Rev 1994;52:253-265.
10. Halliwell B. Medicate cell reinforcement impacts: A reason for medication determination. Drugs 1991;42:569-605.
11. Chance B, Sies H, Boveris A. Hydroperoxide digestion system in mammalian organs. Physiol. Rev. 1979;59:527-605.
12. Granger D.N. Part of xanthine oxidase and granulocytes in ischemia-reperfusion damage. Am. J. Physiol. 1988;255:1269-1275.
13. del Rio LA, Sandalio LM, Palma JM et al. Digestion system of oxygen radicals in peroxisomes and cell suggestions. Free Rad. Biol Med 1992;13:557-580.
14. Koppenol WH. The centennial of the Fenton response. Free Rad. Biol Med 1993;15:645-651.
15. Halliwell B. Cell reinforcements in human wellbeing and sickness. Annu Rev Nutr 1996;16:33-50.
16. Weiss SJ, Klein R, Slivka A, Wei M. Chlorination of taurine by human neutrophils. J Clin Invest 1982;70:598-607.

Study Of Impact Of Existed Total Dissolved Solids In Waste Water On Aquatic Organisms

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ABSTRACT

Total up to breaks down solids (TDS) are normally present in water or are the aftereffect of mining or some industrial treatment of water. TDS contain minerals and organic molecules that give advantages, for example, supplements or contaminants, for example, toxic metals and organic pollutants. Ebb and flow regulations require the occasional observing of TDS, which is an estimation of inorganic salts, organic issue and other broke down materials in water. Measurements of TDS don't separate among ions. The measure of TDS in a water test is measured by sifting the specimen through a 2.0 µm pore estimate channel, vanishing the rest of the filtrate and afterward drying what is left to a consistent weight at 180ºC. The fixation and arrangement of TDS in regular waters is determined by the topography of the drainage, atmospheric precipitation and the water adjust (evaporation-precipitation). The mean saltiness of the world's streams is roughly 120 mg $L^{-}1$ and the real anion found in regular waters is bicarbonate. The most ordinarily happening cation in new water is calcium. Changes in TDS concentrations in normal waters frequently result from industrial effluent, changes to the water adjust (by restricting inflow, by expanded water utilize or expanded precipitation), or by salt-water interruption. It is suggested that diverse points of confinement for singular ions, instead of TDS, be utilized for salmonid species. These cutoff points ought to be founded on the impact of the particle on treatment and egg development.

1. Introduction

Total Dissolved Solid (TDS) is a measurement of inorganic salts, organic issue and other disintegrated materials in water. Measurements of TDS don't separate among ions. The measure of TDS in a water test is measured by separating the example through a 2.0 µm pore estimate channel, vanishing the rest of the filtrate and after that drying what is left to a steady weight at 180ºC [1]. The concentration and composition of TDS in characteristic waters is determined by the topography of the drainage, atmospheric precipitation and the water adjust (evaporation-precipitation). The mean saltiness of the world's waterways is around 120 mg $L^{-}1$ and the significant anion found in normal waters is bicarbonate, with a mean for all North American stream waters of 68 mg $L^{-}1$. The second most normal anion is sulfate, with a mean concentration of 20 mg $L^{-}1$. The most normally happening cation in crisp water is calcium, with a mean of all North American waterway waters for which information were accessible, of 21 mg $L^{-}1$; the following most generally happening cations are sodium and silica, each with a normal concentration of 9 mg $L^{-}1$ [2]. Water with total broke down solids concentrations more

noteworthy than 1000 mg L^{-1} is thought to be "harsh". Changes in TDS concentrations in regular waters frequently result from industrial effluent, changes to the water adjust, or by salt-water interruption [3].

Total broke down solids cause toxicity through increments in saltiness, changes in the ionic composition of the water and toxicity of individual ions. Increments in saltiness have been appeared to cause moves in biotic groups, confine biodiversity, bar less-tolerant species and cause intense or unending impacts at particular life stages [4]. It has been found a huge and negative connection between's concentrations of chlorophyll-an (a gauge of primary generation) and concentrations of Na+, Mg2+, SO42-, HCO3 - and CO32-.

Changes in the ionic composition of water can prohibit a few species while advancing populace development of others. For instance, Derry et al.[5] found that the rotifer Brachionusplicatilis and the harpactacoid copepod Cletocamptus sp. won in lakes with Cl ruled water. Interestingly, the calanoid copepods Leptodiaptoumssicillis and Diaptomusnevadensis were overwhelming in the SO42-/CO3 2- - ruled lake water.

It has expressed that the composition of particular ions determined toxicity of raised TDS in common waters. When all is said in done, they discovered relative particle
toxicity was K+ > HCO3-= Mg2+ >Cl-> SO42-. Ca2+ and Na+ did not create huge toxicity. For C. dubia and D.magna, toxicity of Cl-, SO42-and K+ were lessened in solutions containing more than one cation.

The decent variety of aquatic species decrease as osmotic resiliences are surpassed with expanding saltiness. Concentrations of particular ions may achieve toxic levels for specific species of life history stages. Stekoll et al.[6] distinguished Ca2+ as the primary particle in charge of restraining lid of salmonid eggs uncovered amid preparation. It has been discovered that the expansion of potassium chloride notably expanded copper toxicity, while expansion of calcium chloride and sodium chloride generously decreased it. It has been accounted for that spermatozoa movement was repressed when little amounts of potassium chloride (19.2 mg L^{-1}) or potassium carbonate (106.2 mg L^{-1}) were included. The present principles of utilizing TDS may be reexamined to screen particular ions in light of future risk evaluations.

2. Materials And Methods

In order to assess gaps in knowledge and new developments in philosophy with respect to TDS in

Alaska waters, we examined the companion assessed literature and authority reports to arrange accessible information on toxicity identified with TDS. More than forty reports, modified works and papers were examined which archive the impacts of raised TDS on angle generating and raising, aquatic spineless creatures and aquatic vertebrates. The data is outlined in tables announcing the toxicity of TDS, including the species and lifearrange tried, the concentration delivering the impact and the endpoint.

This framework and interpretation of the literature depends on the long understanding of the creators.

3. Results

Invertebrates: Authors have detailed an extensive variety of toxicity (either EC50 or LC50) for aquatic invertebrates, contingent upon species and particularly, on the sort of particle (Table 1 and 2). Chapman et al.[9] uncovered chironomid (Chironomustentans) hatchlings to two engineered TDS blends demonstrated after the ionic composition of two mine effluents from Alaskan mining operations. The TDS was essentially CaSO4.

They announced noteworthy impacts in the chironomid hatchlings over 1100 mg $L^{-}1$. Hoke et al.[10] announced a 48-h LC50 of 735 mg $L^{-}1$ for C. dubia presented to NaHCO3 and a 48-h LC50 >5000 mg L^{-1} for Daphnia magna presented to NaCl.

Mount et al.[7] detailed an extensive variety of toxicities for C. dubia and D. magna, contingent upon the ionic composition (Table 1). The analysts revealed that blends of KHCO3 + K2SO4 had the most minimal 24-h and 48-h LC50 concentrations for C. dubia (390 mg $L^{-}1$ for both 24-h and 48-h). Blends of CaSO4 and K2CO4 brought about 24-h LC50 of 1140 mg $L^{-}1$ and 48-h LC50 of 1130 for C. dubia. Different blends of ions brought about LC50 concentrations in the range of 2,000 to 4,000 mg $L^{-}1$ and with a few blends,
considerably higher.

Fish: Tests on salmonidae (trout, singe, salmon, grayling, whitefish) exposure to large amounts of TDS have yielded blended outcomes, contingent on when exposure occurred. Chapman et al.[8] uncovered embryonic and adolescent rainbow trout (O. mykiss) to two manufactured TDS blends demonstrated after the ionic composition of two mine effluents from Alaskan mining operations. No huge impacts of the exposures were found on the rainbow trout up to 2000 mg L^{-1}. Their outcomes are steady with the aftereffects of Stekoll et al.[9] for exposures after treatment

Stekoll, et al.[10] uncovered coho salmon developing lives to lifted TDS amid various life stages, from present preparation on secure sear. They found no noteworthy increment in mortalities with higher concentrations of TDS and presumed that these life stages were unaffected by TDS exposure in either the short or long haul. Be that as it may, when the coho salmon (O. kisutch) were uncovered at treatment, higher concentrations brought about diminished bring forth rates and deferred incubate, and in addition long haul consequences for growth and development.

They observed coho salmon to be delicate to TDS exposure at preparation yet not at other embryonic life stages or the adolescent stages from alevin to fasten. Eggs uncovered at preparation that brought forth indicated impacts in later development, i.e., eggs presented to higher concentrations (1875 and 2500 ppm TDS) had high death rates between the looked at and alevin stages.In the 2500-ppm concentration range, they discovered half mortality of the half that had been treated. Brix and Grosell[11] led comparable investigations on Dolly Varden (Salvelinusmalma) and Arctic grayling (Thymallusarcticus). They revealed a LOEC for Arctic grayling going from 254 to >2782 mg $L^{-}1$ TDS and a LOEC for Dolly Varden extending from >1704 to >1817. Their outcomes for Dolly Varden are like the outcomes Arctic scorch; it has revealed a LOEC of 1875. The wide range in the LOEC for Arctic grayling is perhaps identified with the readiness of the fish when eggs and milt were taken

Table 1: Studies of effects of elevated TDS on freshwater aquatic invertebrates

Species		TDS	Effects Unit	Effects Concentration		Reference
		Components			mg $L^{-}1$	
Chironomus tentans	Diptera larvae	CaSO4	Growth reduced by 45%		2,089	Chapman et al.[9]
C.tentans	Diptera larvae	CaSO4	Reduced survival		1,750 and 2,240	Chapman et al. [9]
C.tentans	Diptera larvae	CaSO4	10 day, LC501		2,035	USEPA[22]
C.tentans	Diptera larvae	CaSO4	IC20		1,598	USEPA[23]
Cricotopus trifascia	Diptera larvae	K+	LC50		1567	Hamilton 1975, cited in ENSR[24]
C. trifascia	Diptera larvae	CL-	LC50		1406	Hamilton 1975, cited in ENSR[24]
Hexagenia bilineata	Insect: mayfly	K, Li, Mg, Mo, Na, SO4, NO3	15 day test, 80% survival		2,270	Woodward et al.[25]
H. bilineata	Insect: mayfly	K, Li, Mg, Mo, Na, SO4, NO3	30 day test, 70% survival		1,230	Woodward et al.[25]
Hydroptila angusta	Insect: caddisfly	K+	LC50		2316	Hamilton 1975, cited in ENSR[24]
Hydroptila angusta	Insect: caddisfly	Cl-	LC50		2077	Hamilton 1975, cited in ENSR[24]
Dugesia gonocephala	flatworm	Cl-	Mortality		1230	**Palladina 1980, cited in ENSR[24]**
Tubifextubifex	segmented		K+	EC501	2000	**Khangarot 1991, cited in** ENSR[24]

Tubifextubifex	worm segmented		Ca+2	EC50	814	Khangarot 1991, cited in ENSR[24]
Cyclops	worm cyclopoid		Mg+2	EC50	280	Baudoin 1974, cited in ENSR[24]
abyssorum	copepod					
prealpinus C.abyssorum	cyclopoid		Ca+2	EC50	7000	Baudoin 1974, cited in ENSR[24]
prealpinus	copepod					
C. dubia	zooplankton			LC50	1,692	Tietge and Hockett[26]
C. dubia	zooplankton		NaCl	48-hr, LC50	835	Hokeet al.[10]
C. dubia	zooplankton		NaCl	48-hr, LC50	735	Hokeet al.[10]
Cladoceran	zooplankton		CaSO4	LC50, 48-h	>1,910	Mount et al.[7]
D. pulex	zooplankton		Ca, ion	EC50, 48-h	499	Goodfellowet al.[27]
D. magna	zooplankton			LC50	1,692	Tietge and Hockett[25]
D. magna	zooplankton	<24 h	NaCl	48-hr, LC50	5015	Hokeet al.[10]
D. magna	zooplankton	<24 h	NaCl	48-hr, LC50	5000	Hokeet al.[10]
D. magna	zooplankton	4th instar	NaCl	48-hr, LC50	4000	Hokeet al.[10]
D. magna	zooplankton	<24 h	NaHCO3	48-hr, LC50	1400	Hokeet al.[10]
D. magna	zooplankton	<24 h	NaHCO3	48-hr, LC50	1150	Hokeet al.[10]
D. magna	zooplankton	7 day	NaHCO3	48-hr, LC50	1780	Hokeet al.[10]
D. magna	zooplankton	7 day	NaHCO3	48-hr, LC50	2200	Hokeet al.[10]
D. magna	zooplankton	7 day	NaHCO3	48-hr, LC50	1250	Hokeet al.[10]
D. magna	zooplankton	<24 h	NaHCO3	48-hr, LC50	1160	Hokeet al.[10]
D. magna	zooplankton	<24 h	NaHCO3	48-hr, LC50	1000	Hokeet al.[10]
Mysidopsis bahia	mysid shrimp		Ca, ion	LC50, 96-h	927	Goodfellowet al.[27]

- LC50 = Lethal Concentration 50, or concentration causing 50% mortality
- IC0 = Inhibition Concentration 0, or concentration causing inhibition of 0% of the population.
- EC50 = Effects Concentration, or concentration effecting 50% of the population.

Table 2: Studies of effects of elevated TDS on aquatic plants, algae and bacteria reported in published literature

Species	Effects	TDS	Effects Unit	Notes	Reference
	Concentration	Components			
	mg/L				
Algae, species not given	>1400	Not specified		Decline in productivity	Kerekes and Nursall[28] in Sorensen et al.[19]
Selanastrum capricornutum	551.3	CaSO4	EC20	All sample concentrations resulted in toxic effects	LeBlond[20]
S. capricornutum	250 – 500			Inhibition of growth	Cleave et al. 1976, in Sorensen et al.[19]
S. capricornutum	>2020	CaCO4	Growth inhibition	No toxic effects at 99,EVS Environment Consultants[29] 664, 1180, or 1640	
Nitrogen-fixing bluegreen bacteria	~2450	TDS		Nitrogen fixation limited	Evans and Prepas[22]
Vibrio fischeri	1960	CaSO4	EC20	Inhibited growth	LeBlond and Duffy[21]
Ceratophyllus demersu,	1170			elimination of sensitive species	Hallock and Hallock[5]
Typhasp	1170			elimination of sensitive species	Hallock and Hallock[5]

Table 3: The most toxic ions or combinations of ions identified. Ions are ordered from most toxic toleast toxic for each species

Ceriodaphniadubia	Daphnia magna	Fathead minnow
24-h test	24-h test	96-h test
KHCO3 + K2SO4	KHCO3 + K2SO4	KHCO3
KHCO3 + KCl	KHCO3	K2SO4
K2SO4 + KCl	KCl	KHCO3 + K2SO4
KCl	K2SO4 + KCl	KHCO3 +NaHCO3
KHCO3	KHCO3 + KCl	K2SO4 + KCl
K2SO4	K2SO4	KHCO3 + KCl
MgCl2 + KHCO3		NaHCO3
KHCO3 + NaHCO3		KCl
MgSO4 + KHCO3		

4. Discussion

The measurement of TDS coordinates all anions and cations in the specimen and a few ions or combinations of ions are considerably more toxic than different ions or combinations of ions. A species may be touchier to TDS toxicity at certain life stages, the same number of fish are amid treatment. Therefore, a water quality standard for TDS can adopt a few strategies: 1) The standard can be set sufficiently low to secure all species and life stages presented to the most toxic ions or mix of ions; 2) The standard can be set to ensure most species and life stages for most ions and combinations of ions; or 3) Different breaking points can be characterized for various classifications of ions or combinations of ions, with a lower constrain amid angle bringing forth, if salmonid species that have been appeared to be delicate to TDS amid preparation and egg development are available.

5. Conclusion

Approach (1) might be pointlessly prohibitive, albeit less complex to characterize and actualize. Approach (2), albeit less prohibitive, may prompt antagonistic impacts to aquatic groups. Approach (3) is more convoluted to characterize and would require that the potential discharger determine the composition of the effluent and which species and life stages are available downstream of the effluent. Generally speaking, Approach (3) would give the best protection to aquatic species and the minimum pointless limitation to potential dischargers. The examination of Mount et al.7 gives data on toxicity of various ions and particle combinations. Of the ionsand combinations of ions tried by Mount, et al., the most toxic to C. dubia, D.magna and fathead minnows are appeared on Table 3, requested from most toxic to less toxic. All tests with these ions brought about LC50 esteems under 1,000 mg $L^{-}1$.

6. References

1. Wetzel, R.G., 1983. Limnology. Sec. Ed.n. Saunders College Publishing, NY, pp: 767.

2. Bierhuize,n J.F.H. and E.E. Prepas, 1985. Relationship between nutrients, dominant ions and phytoplankton standing crop in prairie saline lakes. Can. J. Fish. Aquat. Sci., 42: 1588- 1594.

3. Hallock, R.J. and L.L. Hallock (Ed.), 1993. Detailed Study of Irrigation Drainage in and near

4. Wildlife Management Areas, West- Central Nevada, 1987-90. Part B. Effect on Biota in Stillwater and Fernley Wildlife Management Areas and other Nearby Wetlands. US Geological Survey, Water Resources Investigations Report 92-4024B.

5. Derry, A.M., E.E. Prepas and P.D.N. Hebert, 2003. A comparison of zooplankton communities in saline lakewater with variable anion composition. Hydrobiologia, 505: 199-215.

6. Stekoll, M., W. Smoker, I. Wang and B. Failor, 2003a. Final report for ASTF grant #98-1-012. Salmon as a bioassay model of effects of total dissolved solids. Juneau, Alaska, University of Alaska – Fairbanks, pp: 87.

7. Chapman, P.M., H. Bailey and E. Canaria, 2000. Toxicity of total dissolved solids associated with two mine effluents to chironomid larvae and early lifestages of rainbow trout. Environ. Toxicol. Chem., 19: 210-214.

8. Mount, D.R., D.D. Gulley, J.R. Hockett, T.D. Garrison and J.M. Evans, 1997. Statistical models to predict the toxicity of major ions to C. dubia, Daphnia magna and Pimephalespromelas(Fathead Minnows). Environ. Toxicol. Chem., 16: 2009-2019.

9. Stekoll, M., W.Smoker, I. Wang and W. Hayes, 2003b. Final report on the effects of total dissolved solids on fertilization rates of salmonids in the Red Dog Mine area. Juneau, Alaska, University of Alaska – Fairbanks, pp: 27.

10. Stekoll, M., W. Smoker, I. Wang and B. Failor, 2001. Fourth Quarter 2000 Report for ASTF Grant #98-012, Project: Salmon as a Bioassay Model of Effects of Total Dissolved Solids. 17 January 2001.

11. Brix, K.V. and M. Grosell, 2005 Report on the effects of total dissolved solids on arctic grayling and dolly varden fertilization success. Teck Cominco Red Dog Mine, Kotzebue, AK.

A Study On The Problems Of Agricultural Marketing Of Banana In Thoothukudi District, Tamil Nadu

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1. Introduction

"Marketing is a total system of interacting business activities designed to plan, price, promote and distribute, satisfying products and services to present and potential customers" William Stanton."Marketing is the process by which an organization relates creatively productively and profitably to the market place. Marketing is threat of creating and satisfying customers at a profit. Marketing is getting the right goods and services to the right people at the right places at a right time at the right price with the right communications and promotion" Philip Kotler.

India occupies the largest area under banana in the world. It may be noted that 11 percent of the total global area under banana cultivation belongs to India. India ranks first in banana production, contributing about 23 % in world pool of banana production. Banana is the second most important fruit crop in India next to mango. All parts of the banana plant have medicinal application, some of the specific diseases known to be cured by banana are Anemia, blood pressure, brain fever, constipation and depression.

Banana is the most widely consumed fruit, and is an attractive perennial fruit crop for small farmers. This is due to its high economic gains throughout the year compared to othercrops like rice and wheat. Among 29 districtsof Tamilnadu, Thoothukudi district ranks first in exporting banana. So Thoothukudiis selected for the present study. The overall objective of the study was to examine problems of agricultural marketing of banana.

The country loses more than Rs. 58,000 crore worth of agriculture food items due to lack of post harvesting infrastructure such as transportation, and storage facilities. Production of food grains goes waste because of lack of proper retailing and adequate storage capacity. More than 72 percent of the vegetable and fruits are wasted in the absence of proper retailing. The marketing system should be so designed as to give proper reward or return to the efforts of the tiller of the soil.

2. Review of literature

[1]Archarya and Agarwal (1987) insist on a sound knowledge of agricultural marketing system as proper understanding of it will help in efficient services in the transfer of farm products from the producers to the consumers. An efficient marketing system will minimize the cost of the product and maximise the benefits of the producers and the consumers too.

[2]Kolter (1988) remarked that marketing channel can be viewed as a set of interdependent organization involved in the process of making a product or service available for use or consumption.

[3]According to Dasanathan (1990) the market regulation system has to look into the socio economic problems that exist as the farmers sell their commodities at a less favourable place at the most convenient time. He is the least benefited. Centralization of trade with effective implementation of the regulatory provision of the act will undoubtable result in the benefit of the farmers.

[4]Tarit Kumar Datta's (2004) study of the problems of the agri markets in Sunderban region, West Bengal has informed us how they lack even the minimum requisite for the agricultural transaction progress.

[5]Raghurama (2005) showed that the marketing was the be-all and the end all of all economic activities of a farmer. It will better the price of the produce, increase the income and thereby the standard of living of farmers and nullify the exploitation of such farmers by traders and money lenders. Globalization will not be an immediate answer to the marketing problems of rural area.

3. Objectives of the study

1. To examine the problems faced by the farmers in marketing of banana.
2. To offer suggestions to improve the marketing of banana in Thoothukudidistrict.

4. Study area

Thoothukudi district is divided into eight taluks for administration purpose and 12 revenue blocks for rural and urban developments. Since the study is on the marketing of banana, two taluks namely Srivaikuntam and Tiruchendur are selected for the study.

The banana in Thoothukudi District for the period of 2006-2011 is given in the table 1

Selection of farmers

For collecting the primary data one revenue block from Srivaikuntamtaluk viz., Srivaikuntamand one revenue block from Tiruchendurtaluk viz., Tiruchendur were selected, at random. In total, 200 farmers were selected, 100 farmers from each block mentioned above. The distributions of sample farmers are given in the table 1.

Table 1 Distribution of farmers in the study area

S.No	Taluk	Revenue Block	No. of farmers
1	Srivaikunatam	Srivaikunatam	100
2	Tiruchendur	Tiruchendur	100
	Total		200

5. Period of study

The study involves only primary survey; primary data has to be collected for the period 2012-2013.

6. Hypothesis

1. There is no relationship between the experience of the farmers and variety of banana cultivation.
2. There is no relationship between total annual income (in lakhs) of farmers and variety of banana cultivation.
3. There is no relationship between problems faced in marketing of banana and problem faced in banana cultivation.

7. Analysis and interpretation

Analysis and interpretation are central steps in the research process. The aim of the analysis is to organize, classify and summarize the collected data so that they can be comprehended and interpreted to give answers to the questions that triggered the research. Interpretation is the search for the broader meaning of findings. Analysis is not fulfilled without interpretation; and interpretation cannot proceed without analysis. So, both are interdependent.

8. Descriptive Analysis on Farmers

Percentage analysis is one of the statistical measures used to describe the characteristics of the sample in totality. Percentage analysis involves computing measure of variable selected for the study and the finding can be interpreted easily.

Table -2 Frequency Distribution of farmers by their experience

Experience in years	Frequency	Percentage
Below 5	8	4
6-10	35	17.5
11-15	49	24.5
>15	108	54
Total	**200**	**100**

Source : Survey Data

The above table-3 shows that 54% of the farmers are in the group of above 15 years experience, 24.5% of farmers are in the 11 to 15 years experience, 17.5% of farmers are in the group of 6 to 10 years of experience and 4% of farmers fall below 5 years of experience. Compare to all other categories above 15 years of experience category has higher number of respondents.

Table – 3 Frequency Distribution of farmers based on their age

Age group in years	Frequency	Percentage
Below 30	30	15
31-40	36	18
41-50	64	32
Above 50	70	35
Total	**200**	**100**

Source: Survey Data

The table 3exhibits that nearly 15% of the farmers are in the age group of below 30years, 18% of the farmers are between 31 to 40 years, nearly 32% are between 41 to 50 years and about 35% of the farmers have crossed 50 years. Study reveals that majority of the farmers are in their prime production age of 50 years.

Table - 4 Frequency Distribution of farmers based on their occupation

Occupation	Frequency	Percentage
Main	194	97.0
Subsidiary	6	3.0
Total	**200**	**100**

Source: Survey Data

In the table 4 above nearly 97 percent of the sample farmers have agriculture as main business and only 3 percent of the sample farmers have it as subsidiary occupation. Therefore it is proved that majority of the farmers have agriculture as main occupation.

Table -5 Frequency Distribution of farmers based on annual income

Annual income in lakhs	Frequency	Percentage
Below 1	92	46
1-2	70	35
Above 2	38	19
Total	**200**	**100**

Source: Survey Data

It is observed from the table5 that 46% of the farmers have below one lakh as their annual income, 19% of farmers have above two lakhs as annual income and 35% of farmers are in the category of 1-2 lakh annual income. Compared to all other categories, below 1 lakh category has higher number of respondents.

Table -6 Frequency Distribution of farmers based on reason for cultivating banana

Reason for cultivating banana	Frequency	Percentage
Suitability of land conditions	100	50
More water supply	40	20
Less expenditure	20	10
Profitability	10	5
Continuous demand	20	10
Marketability	10	5
Total	**200**	**100**

Source : Survey Data

It can be observed from the table 6 that, 50% and 20% of the farmers cultivate banana because the land and soil is suitable for it and enough water supply is available to them.10% of the farmers cultivate banana because it is less expensive, 5% of the farmers cultivate banana because it yields more profit, 10% of the farmers cultivate banana because it has continuous demand and 5% of the farmers cultivate banana due to marketability. Compared to all other reasons most of the farmers prefer banana cultivation because the land and soil texture is suitable for it.

Table – 7 Frequency distribution of farmers based on problems faced in banana marketing

Problem faced in marketing	Frequency	Percentage
Lack of assured price	11	5.5
Low price per unit	21	10.5
High transportation charges	72	36
Perish ability of the banana	21	10.5
Collusion among the traders	28	14
Absence of cold storage	22	11
Lack of ripening chambers	25	12.5
Total	**200**	**100**

Source : Survey Data

From the above table 7, It can be noted that 5% of the farmers face the problem of lack of assured price, 10.5% get low price per unit, 36% have high transportation charges, 10.5% have to face the problem of perishability of banana, 14% have to face the problem of collusion among the traders, 11% of the farmers have absence of cold storage facilities and 12.5% of farmers face the problem of lack of ripening chambers. By compared to all other problems, high transportation charges represented the highest.

Table -8 Frequency Distribution of farmers based on reason for selecting particular market

Reason for selectingparticular market	Frequency	Percentage
Less distance	60	30
More convenience	46	23
Profitability	28	14
Continuous demand	36	18
Marketability	30	15
Total	**200**	**100**

Source : Survey Data

It is observed from the table - 8 that 30% of the farmers have selected the market place to sell their produce based on less distance, 23% of the sample farmers selected their market place based on more convenience, 14% of the farmers selected market place on the basis of profitability, 18% farmers selected the market place based on continuous demand existing in the market and 15% of the farmers selected market place based on marketability.

Inferential analysis on sample

Hypothesis I

Null Hypothesis: There is no relationship between experience of the farmers and the variety of banana cultivation.

Chi square test for relationship between experience of the farmers and variety of banana cultivation

Table - 9

Experience in farming	Kathali	Nadu	Sakkai	Total	Chi square value	Table value
Below 5	2	1	5	8	8.767	12.592
6 to 10	13	8	14	35		
11 to 15	21	11	17	49		
Above 15	54	10	44	108		
Total	**90**	**30**	**80**	**200**		

Source : Survey Data

The calculated t value is 8.767 and the table value is 12.592 at 5% level of significance,6 degree of freedom. The calculated value is less than the table value. Therefore the hypotheses is accepted. Hence, there is no relationship between experience of the farmers and variety of banana cultivation.

Hypothesis II

Null Hypothesis: There is no relationship between total annual income of farmers and variety of banana cultivation.

Chi square test for relationship between total annual income of farmers and variety of banana cultivation.

Table - 10

Total annual income (in Lakhs)	Kathali	Nadu	Sakkai	Total	Chi square value	Table value
Below 1	41	12	39	92	7.990	9.488
1 - 2	26	11	33	70		
Above 2	23	7	8	38		
Total	**90**	**30**	**80**	**200**		

Source : Survey Data

The calculated t value is 7.990 and the table value is 9.488 at 5% level of significance 4 degree of freedom. The calculated value is less than the table value. Therefore the hypotheses is accepted. Hence, there is no relationship between total annual income of farmers and the variety of banana cultivation.

Hypothesis III

Null Hypothesis: There is no relationship between problems faced in marketing of banana and banana cultivation.

Chi square test for relationship between problems faced in marketing of banana and banana cultivation.

Table - 11

Problems faced in marketing of banana	Kathali	Nadu	Sakkai	Total	Chi square value	Table value
Lack of assured price	4	2	5	11	11.529	21.026
Low price per unit	10	3	8	21		
High transportation charges	39	6	27	72		
Perish ability of the banana	8	4	9	21		
Collusion among the traders	11	5	12	28		
Absence of cold storage	9	2	11	22		
Lack of ripening chambers	9	8	8	25		
Total	**90**	**30**	**80**	**200**		

Source : Survey Data

The calculated 't' value is 11.529 and the table value is 21.026 at 5% level of significance 12 degree of freedom. The calculated value is less than the table value. Therefore the hypotheses is accepted. Hence, there is no relationship between problems faced in marketing and banana cultivation.

The following suggestion are studied from the following table 13 Suggestions to overcome the problems of marketing

Table- 12

S.No	Suggestions'	Frequency	Percentage
1	Establishment of more market centre	40	20
2	Adequate export facilities	10	5
3	Provide tax concession	6	3
4	Easy customs formalities	6	3
5	subsidy from government	20	10
6	Provide loan on easy terms by the financial institutions	20	10
7	To reduce delay in loan sanction	10	5
8	to introduce uniform wage payment	14	7
9	Availability of skilled labour	10	5
10	Adequate cold storage facilities	10	5
11	Adequate transport facilities with cheap cargo	14	7
12	Establishment of information centre	6	3
13	To get training on marketing	4	2
14	Reduce the check post & toll gate charges	30	15
	Total	**200**	**100**

Source: Primary data

From the above table12, it can be noted that 20% of the farmers need establishment of more market centres, 5% of the farmers need adequate export facilities, 3% of the farmers need provision of tax concession, 3% of the farmers need easy customs formalities, 10% of the farmers need subsidy from government, 10% of the farmers need the provision of loan on easy terms by the financial institutions, 5% of the farmers need reduction of delay in loan sanction, 7% of the farmers need more availability of skilled labour, 5% of the farmers need adequate cold storage facilities, 7% of the farmers need adequate transport facilities with cheap cargo, 3% of the farmers need training on marketing, 15% of the farmers need reduction of check post & toll gate charges.

Findings

- Among all, farmers having 15 years of experience are highest in the respondents.
- Study reveals that majority of the farmers are in their prime production age of above 50 years.
- Nearly 97% of the sample farmers have agriculture as main business and only 3% of the sample farmers have it as subsidiary business. Therefore, majority of the farmers have agriculture as main business.

- Compared to all other categories, below 1 lakh category has higher number of respondents.
- All farmers are aware of the market prices while selling.

When compared to all other problems, the high transportation represented the highest.

- No farmers attended farmer – buyer meet.
- All farmers are members of farmers association since there was no separate banana growers association.

Suggestion

- Bananas and plantains are second largest fruit crop and a very important staple food commodity around the world.
- Inter personal meetings must be conducted between farmers and buyers.
- As per sample survey, farmer community is literates. Government must motivate them to attend such meetings. Periodical meetings with film demonstration, along with cultural activities will be helpful in creating an interpersonal relationship between farmers and buyers.
- Farmers who have experiences more than 15 years can be involved in conducting sessions for the less experienced.
- They may be encouraged to form an association only for banana cultivators so that they can focus on the issues regarding banana cultivation.
- Journals should be released by the agricultural department in a simple language which will provide the information through updated technology, interstate marketing etc.,
- Healthy competition with regard to the cultivation of banana may be announced during the meetings so that the attendants will be more.
- A full pledged regulated marketing is needed for banana.
- Immediate need of cold storage of 2000 M.T.
- Ripening centrescan be started with a capacity of 2000 M.T.

Conclusion

The agricultural development policy in the times of yore has intensified the interclass inequalities. Apart from the imputed value of family effort, the other effects like cost of production on the whole income etc., are not favourable to the small farmers. This should be measured by the government. The Government can lend its support to the farmers by providing transport convenience, maintaining good roads and provide financial assistance for suckers and fertilizers, so that the small and average farmers may also have more yield of banana.

Above all, a categorized agricultural marketing is necessary for banana promotion. The study is curbed to only one district in Tamilnadu to be precise in Thoothukudi district. Other studies on the condition in the various districts situation at diverse delta areas may be carried out, so that improved outputs can be made on banana cultivation.

By examining various research results as one, the government can generate awareness among the farmers concerning banana cultivation and may push more farmers to cultivate this precious food, which is greatly vital to our habitual diet system. The marketing system be so designed as to give proper reward or return to the efforts of the farmer.

References

1. Marketing Management Kolter Philip & Keller Kevin Lane Prentice Hall of India Private limited New Delhi (2005)
2. Modern Marketing (2009) R.S.NPillai & BagavathiS.Chand& Company ltd New Delhi.
3. Agricultural Marketing in India SS.Acharya&N.LAgarwal Oxford &IBH Publishing co. Pvt Ltd. New Delhi (1987)
4. Fruits: Ranjit Singh (1992) National Book Trust India. New Delhi.
5. BhataG.R. "Marketing cost and margins of Agricultural commodities" Agricultural Marketing (1996)
6. Mamoria.C.B and R.L.Joshi, Principles and Practices of Marketing in India, Ahmadabad: KitabMahal (1975)
7. Spinks, J.S. Myths about Agricultural Marketing: Technical Forum (1972)
8. Varma.M.M and R.K.Agarwal, Rural and Agricultural Marketing New Delhi Forward Publishing Company (1997)

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