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In vitro multiplication of *Maytenus emarginata.* A tree of the Thar Desert

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***Abstract*- An in vitro method for cloning and mass multiplication of Maytenus emarginata, a highly drought resistant tree of the Indian Desert, has been developed. Shoot segments harvested from a "plus" tree (30-year-old) were cultured to produce multiple shoots (10-15 shoots/explant) on MS medium containing 0.1 mg/l IAA and 2.5 mg/l BAP. In vitro produced shoots were cut into segments and cultured on shoot proliferation medium supplimented with 1.0 mg/1 of BAP for further multiplication of the shoots. Isolated individual shoots were cultured on a filter paper bridge in half strength MS liquid medium containing 25 mg/l of IBA for 72 h in the dark at 28 + 2° C for induction of root. About 70-80 percent of shoots rooted. The treelets developed were hardened and transferred to pots. Thousands of plantlets can be obtained from a single explant. The protocol is highly reproducible and efficient.**

Abbreviations. IAA, indole-3-acetic acid; IBA, indole- 3-butyric acid; NAA, a- naphthalene acetic acid; NOA, B-naphthoxy acetic acid; BAP, 6– benzylaminopurine; Kn, 6-furfurylaminopurine; B5, Gamborg et al. (1968) medium; MS, Murashige and Skoog (1962) medium

Key Words: **Maytenus emarginata, Cloning, Tissue culture, Treelet, Regeneration.**

INTRODUCTION:

Maytenus emarginata (Celastraceae) is an important tree of the Indian Desert, as it is a drought and heat resistant biomass producer. The plant is valuable as it stabilizes the sandy soil and provides fodder and fuel. The plant yields timber and it has medicinal value (Bhandari 1990). During recent years ruthless cutting has resulted in disappearance of valuable germplasm from the arid and semi arid areas. Tissue culture biotechnology provides tools to mass multiply forest trees and to clone selected germplasm (Haissig et al. 1987; Cheliak and Rogers 1990). Though cloning of mature trees is difficult as with the increasing age the ability of shoots to root diminishes considerably. Revigoration and rejuvenation of a mature tree are difficult, though this has been achieved in several systems (Gupta et al 1989,Ahuja 1991). Our laboratory is working on multiplication and cloning of plants of the Indian Desert through tissue culture (Rathore et al. 1991,1992; Shekhawat et al. 1993). Establishment of cultures from shoot explants derived from mature "plus" tree of M. emarginata, proliferation of multiple shoots from axillary and nodal zones, and induction of roots from in vitro produced shoots and treelet formation are described in this communication.

MATERIAL AND METHODS;

In extensive field surveys of the Indian desert, a few plants of M. emarginata (Willd.) Ding-hou, were selected as "plus" trees on the basis of their straight and solid bole and large size. Explants viz apical shoots, shoot segments each with one node/axillary shoot bud were harvested from the mature tree (30-year-old) of M. emarginata. Explants were harvested periodically during all seasons. They were washed with tap water with a few drops of Tween-80, and then surface-sterilized with 0.1% HgCl2: (W/V) for 3-4 min. After thorough washing with autoclaved distilled water, the explants were kept in a sterilized antioxidant solution (aqueous solution of ascorbic acid 0.1% and citric acid 0.05% for 30 min). The explants were cultured on agar gelled media of full and half strength MS (Murashige and Skoog 1962) and BS (Gamborg et al. 1968), Various auxins (IAA, IBA, NAA) in the concentration range of 0.05-2.5 mg/l and cytokinins (Kn, 2-iP and BAP) ranging from 0.1-5.0 mg/l were either added to the medium alone or in various combinations (Table 1). The cultures were incubated at 28 ± 2° C, 60% relative humidity and 35-43 uEm's photon flux density for 12 h/day photoperiods. Shoots/shoot segments, (2.0-2.5 cm in length) were subcultured on MS medium supplemented with various combinations of auxins and cytokinins for further multiplication of shoots. Ascorbic acid (50 mg), citric acid (25 mg) and adenine sulphate (25 mg) were used as additives in the shoot induction and multiplication medium. Full and half strength MS basal,Hellers and White's basal (White 1943) agar gelled media were used with IBA, NAA and NOA (0.1-5.0 mg/l) for root induction from regenerated shoots (Table 2). In addition to agar media, shoots were also kept in half strength MS liquid medium (on a filter paper bridge) containing 2.5 mg/l of IBA for 12, 24, 48 and 72 h and then transferred to hormone-free 1/2 MS semi-solid medium (Table3). After of 35° C under 100 uEm's1 photon flux density for hardening. Rooted plantlets were washed thoroughly with water and transferred to pots containing sand: Vermiculite (3:1).

RESULTS AND DISCUSSION:

Shoot segments with one node (2.5 x 0.4 cm) harvested during the monsoon season (July-August) and in March were explanted for the establishment of cul- tures. Excessive browning at cut ends could be prevented by keeping the explant in antioxidant solution, On MS medium containing 0.1 mg/l of IAA, 2.5 mg/l of BAP and 25.0 mg/l of adenine sulphate,10-12 shoots developed from the nodal region of each of the explants, within 4 weeks. On B5 and half strenght MS media only 5-7 shoots regenerated from the nodal region. Kinetin was found to be less effective than BAP for shoot proliferation .Regenerated shoots could be further multiplied on the same medium but with 1.0 mg/l of BAP, each segment produced 15-20 new shoots within 4 weeks. At higher concentration of

BAP dwarf shoots were formed. These attained normal length by subculturing on MS medium + 0.1 mg/l of IAA + 0.1 mg/l NAA +0.25 mg/l BAP. Addition of auxins higher than 0.1 mg/l caused callusing at the cut ends of the explants. Incorporation of IBA and NAA in place of IAA in medium ,caused callusing from the explants. Shoots produced in vitro rooted best when it was treated with 25.0 mg/l of IBA in half strength MS medium for 72 h in the dark, followed by transfer to semi-solid, hormone-free half strength MS basal medium. Hundreds of plants were rooted ,hardened and transferred to field. The protocol described could be used for preservation and multiplication of depleting germplasm of M. emarginata in arid region and semi arid region of Rajasthan . The developed protocol is very potential for large scale field transfer and afforestation programme. Though initially this protocol was developed for an elite, but we found that this is equally applicable for the propagation of other mature plants of M. emarginata. propagation of other mature plants of M. emarginata.

Cytokinins	**Mg/l**	**Shoot number per node ± SD**	**Shoot length (cm) ± SD**
Control	0.0	2.2 0.4	1.8 0.4
BAP	0.25	5.3±0.7	2.4±0.3
	0.5	8.6±0.8	2.8±0.2
	1.0	10.2±0.8	1.6±0.2
	2.5	16.4±1.9	0.8±0.2
KN	0.25	4.2±0.6	2.6±0.4
	0.5	5.3±0.7	2.6±0.2
	1.0	6.1±0.3	1.9±0.3
	2.5	10.3±0.8	1.2±0.4
2-ip	0.25	4.3±0.5	2.1±0.3
	0.5	5.2±0.6	1.9±0.4
	1.0	5.9±0.4	1.9±0.6
	2.5	9.2±0.6	1.2±0.4

Table 1-Effect of cytokinins on shoot multiplication of M. emarginata on MS medium containing 0.1 mg/l 1AA.

Table 2-Effect of different media on root induction from cultured shoots of M. emarginata.

Media	**% of shoots rooted %**	**Root number ±SD**	**Root length (cm) ±SD**	**Shoot length (cm) ±SD**
MS	13	2.7±0.7	1.8±0.7	3.5±0.6
½ MS	27	4.0±1.1	2.3±0.9	3.9±0.6
Heller	22	4.9±0.8	1.9±0.4	3.2±0.8
White	18	4.9±1.3	1.5±0.4	2.8±0.4

Data scored on 28th day of treatment.

Each medium was supplemented with 2.5 mg/l IBA.

Table 3-Effect of pulse treatment of IBA (25 mg/l) for different time duration on root induction from cultured shoots of M. emarginata.

treatment	**% of shoots rooted %**	**Root number ±SD**	**Root length (cm) ±SD**	**Shoot length (cm) ±SD**
12 h	39	2.4±0.6	2.4±0.7	4.1±0.7
24 h	58	4.5±1.2	2.7±0.9	4.4±0.8
48 h	67	5.1±1.2	2.7±0.8	4.5±0.9
72 h	80	5.9±1.7	2.9±1.1	4.7±1.0

Shoots treatment with IBA 25 mg/l for 12, 24, 48 and 72 h in half strength MS liquid medium on filter paper bridge, thereafter cultured on hormone free-half strength MS agar gelled medium.

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STATISTICAL ANALYSIS AMONG THE ECOLOGICAL PARAMETERS OF INDUSTRIAL WASTE WATER OF U.P. INDIA

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Abstract- **In the present investigation the data collected on the physico-chemical characteristics of the industrial waste water have been analyzed for correlation and regression among the various parameters viz., pH, TS, TDS, TSS, COD, BOD, Acidity Hardness, Cl, SO_4,Ca, Mg, Na, K, etc. This industry is located at Amroha Distt. U.P. in India, for these studies a wizard fast digital computer unit was used. Beside the above analysis standard deviation, relative standard deviation and coefficient of variation in all the parameters have also been evaluated, respectively.**

Key words: **Industrial waste, Ecology, Regression, Correlation coefficient.**

Introduction

Industrial waste water is generated from a wide variety of production and processing processes. Depending on the industry, industrial waste water can be composed of various components. Besides organic compounds like oil fat, alcohol and flavorings, other substances such as heavy metals, acid and alkalis also combine with the water. This kind of waste water must be pretreated before discharging it to public sewage treatment plants or nature or reusing it for internal purposes. Insilco Ltd. Sadullapur Gajraula, Amroha (U.P.) waste water is one of the major waste of ecological concern; the plant is situated 65 Kms. west of Moradabad and manufacturing precipitated silica in different grades for rubber and various non-rubber applications. In the present manuscript the quality of industrial waste water is described according to the correlation and regression of it's physico-chemical parameters.[1, 2, 3] Several workers have carried out similar work for water quality parameters.[4, 5, 6]

Material & Methods

All chemicals and reagents for this research work used were of AR grade of CDH, Indian Glycols and Fulka. Industrial waste water samples were collected from Insilco Ltd. Sadullapur Gajraula, Amroha (U.P.) India unit at monthly intervals from July 2009 to Feb 2010. The samples were analyzed for the physico-chemical parameters by following standard methods[7]. Standard deviation, relative standard deviation and coefficient of variation were calculated for various parameters.[8]

Result and Discussion

All results are shown in table (1-4). Table-1 reveals that average, SD (Standard variation), RSD (Relative Standard deviation) and CV (Coefficient of variation) values of the parameters analyzed for industrial waste water exhibit a declining effect. An attempt has also been made to explain the variation by fig. 1 below the table1. Table 2 and 3 demonstrated by correlation coefficient (r) and coefficient of linear regression A and B. The statistical data of the correlation coefficient between each pair of industrial waste water parameters have been presented in Table-2 and in fig.2 as well. To carry out these extensive numerical calculations a brief details are mentioned below the tables.

Table-1Average values of ecological parameters analyzed for Industrial waste water

Parameters	No. of Sample	Average Value	±SD	RSD	CV%
pH	8	4.5	0.330	0.0733	7.333
TSS mg/l	8	2330	518.31	0.222	22.24
TDS mg/l	8	61410	3415.12	0.0556	5.561
TS mg/l	8	63740	3524.21	0.552	5.529
COD mg/l	8	74013	3120.14	0.0421	4.215
BOD mg/l	8	1265	401.2	0.079	7.984
Acidity mg/l	8	10241	311.12	0.030	3.037
Cl mg/l	8	6450	713.12	0.110	11.056
SO_4 mg/l	8	4123	429.1	0.104	10.407
Hardness mg/l	8	7678	739.63	0.096	9.633
Na mg/l	8	301	37.03	0.123	12.302
K mg/l	8	11603	992.28	0.085	8.551
Ca mg/l	8	1590	401.03	0.252	2.552
Mg mg/l	8	1024	315.25	0.307	3.078

TSS- Total suspended solids; TDS- Total dissolved solids, TS- Total solids COD- chemical oxygen demand, BOD - Biological Oxygen demand.

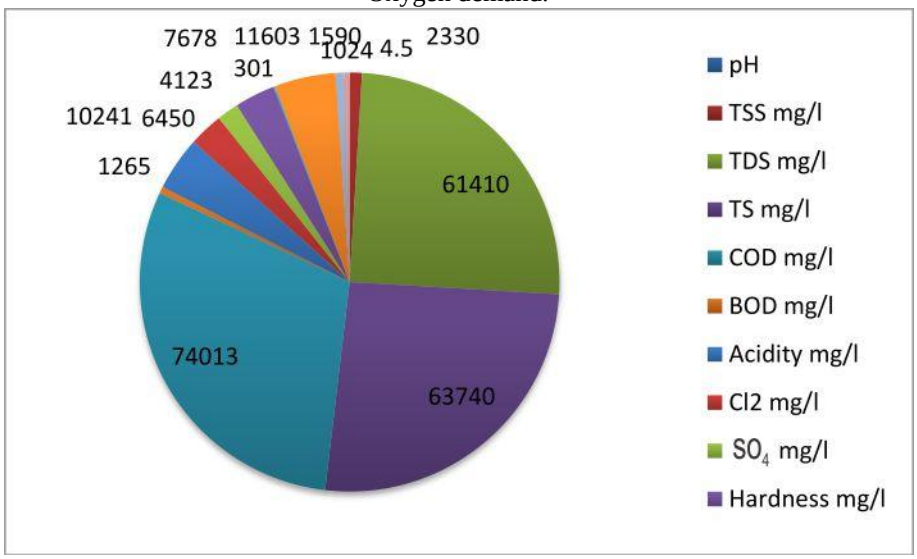

Fig.-1 Diagram showing average value variation (Industrial waste water)

Table-2 Correlation coefficients values for industrial waste water at different ecological parameters

Parameter	pH	TSS	TDS	TS	COD	BOD	Acidity	Cl	SO_4	Hardness	Na	K	Ca	Mg
pH	1.00	0.27	0.27	0.13	-0.54	-0.51	-0.98	-0.45	0.02	0.34	0.05	0.41	-0.16	0.31
TSS		1.00	0.98	0.73	0.24	0.25	-0.33	-0.66	0.48	-0.57	0.03	-0.47	-067	-0.14
TDS			1.00	0.70	0.27	0.28	-0.34	-0.64	0.51	0.53	-0.26	0.42	-0.73	-0.16
TS				1.00	0.02	-0.02	-0.18	0.65	-0.02	0.75	-0.78	-0.72	0.11	0.03
COD					1.00	0.23	0.52	0.06	0.58	-0.15	0.16	-0.31	-0.51	-0.16
BOD						1.00	0.32	0.47	0.01	-0.30	-0.04	-0.38	-0.19	-0.29
Acidity							1.00	0.37	0.10	0.31	0.62	0.33	0.40	-0.20
Cl								1.00	0.11	0.14	0.35	0.18	-0.84	0.05
SO_4									1.00	0.13	0.65	0.41	0.05	0.41
Hardness										1.00	0.55	0.75	-0.24	-0.28
Na											1.00	0.59	0.02	0.18
K												1.00	0.12	0.15
Ca													1.00	0.12
Mg														1.00

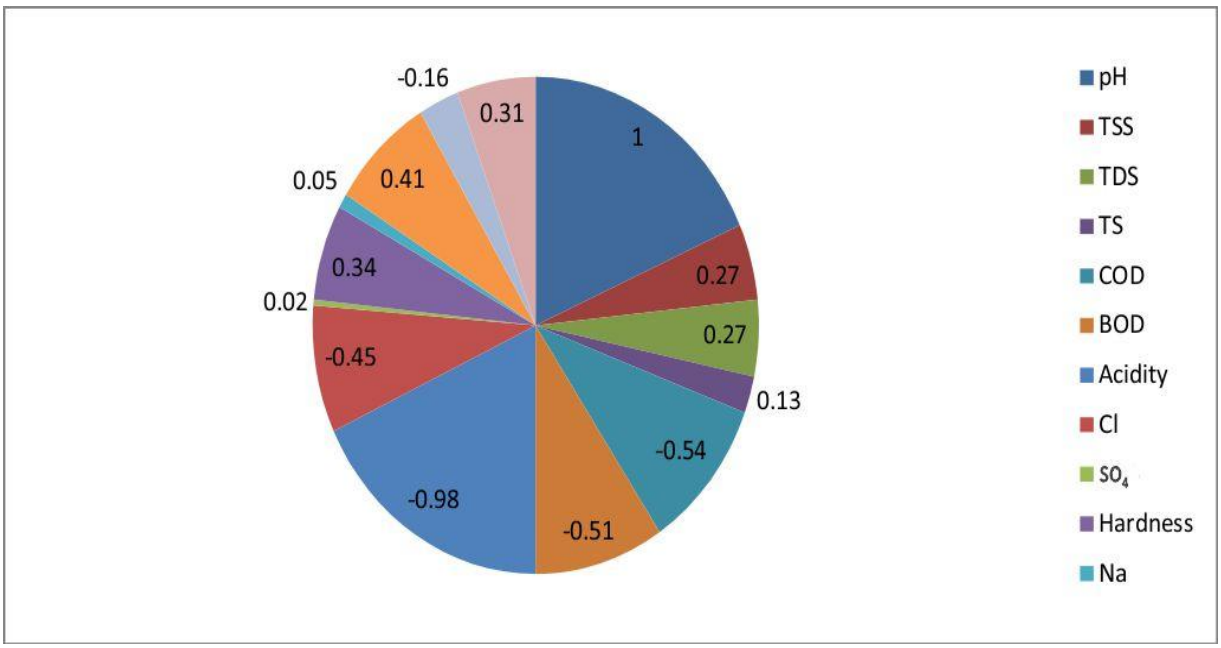

Fig. 2 Statistical diagram of some ecological parameters.

Table-3 Least square fitting for linear relations $y = Ax + B \quad (r \geq \pm 0.60 - \pm 0.99)$ between ecological parameters for industrial waste water.

X		Y	r	A	B
1.	pH	Acidity	-0.99	-1121.71	15512.04
2.	TSS	Cl	-0.76	-1.053	8254.94
	TSS	Hardness	-0.79	-1.120	10039.33
	TSS	Ca	-0.79	-0.728	3293.08
	TSS	Mg	-0.72	-0.414	1863.89
3.	TDS	TSS	0.72	-0.086	3030.51
	TDS	Cl	-0.64	-0.23	13375.86
	TDS	Na	-0.73	-6.653	612.92
4.	TS	TSS	0.99	1.042	-4923
	TS	TSS	0.99	0.079	-3916.07
	TS	Cl	0.77	-0.134	14320.70
	TS	Na	-0.66	-6.554	412146.29
5.	Cl	Ca	0.62	0.358	-150.49
6.	SO_4	Na	-0.84	-0.069	484.34
7.	Hardness	Ca	0.65	0.406	-1401.14
8.	Hardness	Mg	0.91	0.355	-1743.51
	Ca	Mg	0.75	0.468	156.162

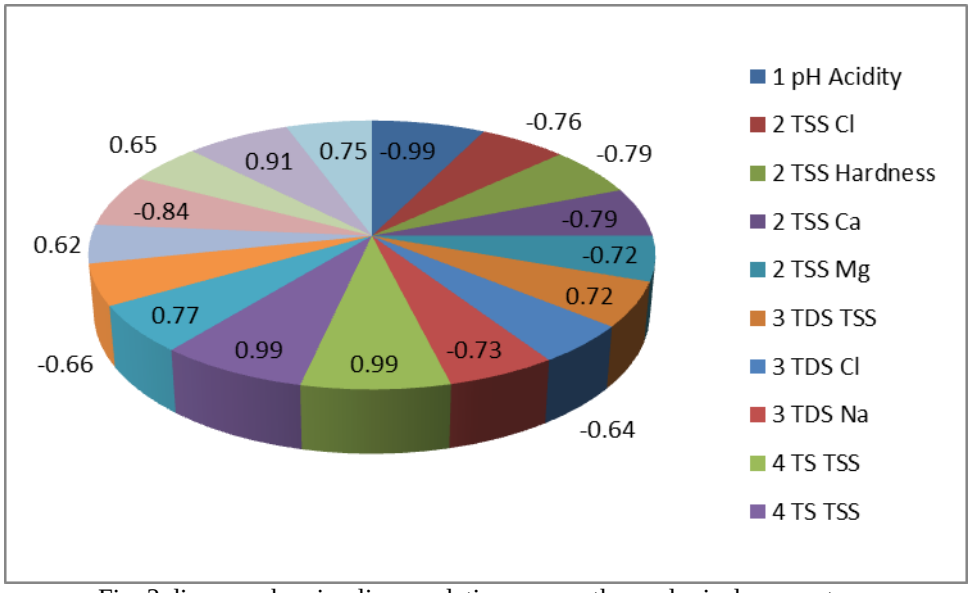

Fig. 3 diagram showing linear relation among the ecological parameters.

Correlation and regression are techniques used to analyze the relationship between two quantitative variables, while correlation measures the strength of a linear relationship between two variables, regression measures how these variables affect each other using an equation. X & Y are the two variable, r-Correlation coefficient has been calculated between each pair of 14 industrial waste water parameters by using the experimental data A & B are the constant

$$r = \frac{\sum xy}{(\sum X^2)(\sum Y^2)} \qquad x = X - \overline{X}$$

$$y = Y - \overline{Y}$$

For higher value of r between X & Y there linear relation will be

$$Y = Ax + B$$

On the basis of above A & B can be calculated

$$Y - \overline{Y} = r\frac{6Y}{6X}(X - \overline{X})$$

Where $\overline{X} = \frac{\sum X}{n}, \qquad \overline{Y} = \frac{\sum Y}{n}$

6Y- Standard deviation of Y

6X- Standard deviation of X
n= no. of observation
All data were run on the digital computer in the dept. of chemistry Hindu College, Moradabad. In the present work most of the observation of pH values was found to be (+ve) between TSS, TDS, TS, Hardness, K, Ca, and Mg etc., whereas most (-ve) values of TSS was observed against the parameters COD, BOD, Acidity, Cl, SO_4, hardness, Na, Ca and Mg etc. The values of R in positive correlation lie between +0.01 to +0.99 and in case of negative correlation -0.02 to -0.99. The high (+ve) correlation value (0.99) was observed in between pH and acidity. The low (+ve) correlation value (0.01) was observed in between BOD and Cl whereas negative (-0.02) value was observed in between TSS and COD, TS & Cl, Na & K, respectively [8]. The value of r in the case of positive correlation nearer to +1 or in the case of negative correlation nearer -1 show that the greater probability of a definite linear relationship exists between the variable of parameters (e.g. X & Y). The values of r that tend towards zero indicate that the pair of parameters are not linearly related[9].
The values of linear relation have been shown in table 3 and also discussed in diagram in fig. 3. Again to save space we have presented the results only for those parameters which have $r \geq \pm 0.60$ to ± 0.99, although we have calculated the value of A & B for each possible pair of 14 parameters[10]. When A & B have been determined the linear relation of the type given equation (y=Ax+B) can be used to predict the value of industrial waste water quality parameters Y, when the values of the parameter X is measured experimentally. With the help of the above linear equation we have predicted the values of TSS and Cl from the experimentally measured values of TDS. The results of the predicted and observed values of TSS and Cl are being given in table 4.
The above findings show that many such positive and negative correlations do exist among these parameters. The very high positive value of r^2 shows that the variation of Y is influenced by changes of X. The high positive values of coefficient of determination (r^2=0.98) of a pair pH and acidity reveals that 98% variations in acidity values are influenced by pH changes. However the possibility of resting 2% can be attributed to other causes. So our task is not only important for environmental scientists but also to the engineer's working on industrial management and research in this area.

Table- 4 Predicted and Observed values of TSS & Chloride as function of TDS

TDS mg/l	TSS mg/l		Cl mg/l	
	P	O	P	O
53724	1750	1925	5630	6610
56424	2008	2483	6181	6100
55531	1943	1412	6283	6438
58301	2140	2283	5993	6283
59991	2320	2542	5743	4435
64801	2718	2743	6172	5502
61498	2438	24479	5573	5872
58900	2224	2115	5892	6036

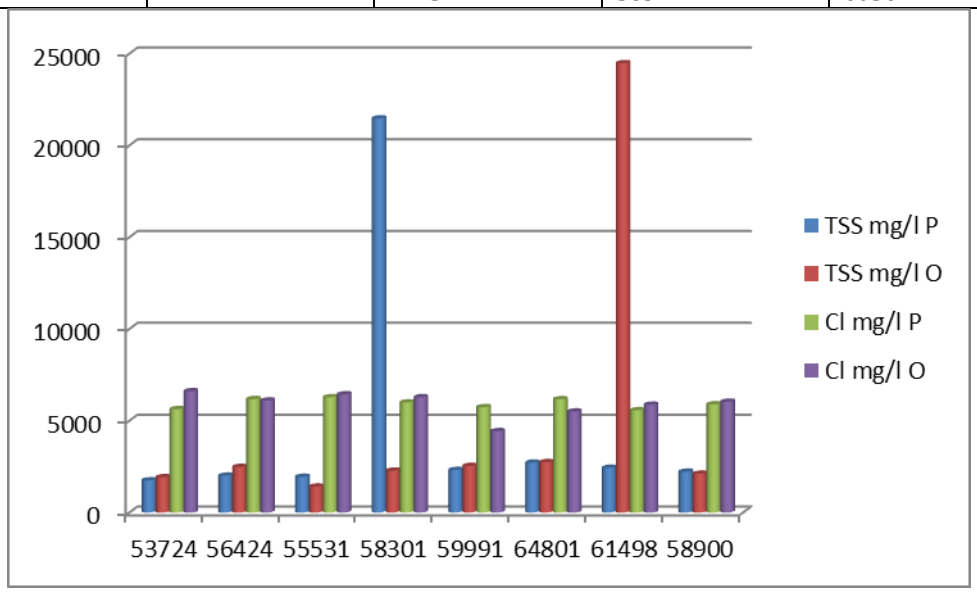

Fig. 4 bar diagram showing experimentally measured value of some parameter of waste water.

This study will provide a baseline data and help to delineate the physico-chemical characteristics of industrial waste water and correlation between them.

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Capital Structure Analysis with Reference to Indian Oil Corporation

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***Abstract*: The economic development of a country depends more on real factors such as the industrial growth & development, modernization of agriculture, expansion of internal trade and foreign trade. A solid and well-functioning financial system is a powerful engine behind economic development of a nation. The major role in financial system is of banking sector. The role and importance of banking sector and the monetary mechanism cannot be under-estimated in the development of a nation. Hence the banks and financial institutions play significant and crucial role by contributing in economic planning. Decomposition analysis has been used to check the structural variability of asset portfolio of Scheduled Commercial Public Sector Banks in India. The study of portfolio behavior of scheduled commercial public sector banks is important as it is a significant explanatory factor for the magnitude and changes in the banking industry.**

***Keywords*: Capital structure, EBIT- EPS Analysis, Profitability**

Introduction:

The assets of a company can be financed either by increasing the owners claim or the creditors claim. The owners claims increase when the firm raises funds by issuing ordinary shares or by retaining the earning, the creditors' claims increase by borrowing The various means of financing represents the "financial structure" of an enterprise. The Financial structure of an enterprise is shown by the left hand side (liabilities plus equity)of the balance sheet. Traditionally, short-term borrowings are excluded from the list of method of financial the firm's capital expenditure, and therefore, the long term claims are said to from the capital structure of the enterprise. The capital structure is used to represent the proportionate relationship between debt and equity. Equity includes paid-up share capital, share premium and reserves and surplus. The financing or capital structure decision is a significant managerial decision. It influences the shareholders returns and risk consequently; the market value of share may be affected by the capital structure decision. The company will have to plan its capital structure initially at the time of its promotions. The capital structure is how firm finances its overall operations and growth by using different sources of funds. Debt comes in the form of bond issues or long-term Notes payable, while equity is classified as common stock, preferred stock or retained Earning.
The financing or capital structure, decision is a significant managerial decision. It influences the shareholders return and risk. Consequently the market value of the share may be affected by the capital structure decision. The firm will have to plan its capital structure initially at the time of its promotion. The decision will involve an analysis of the existing capital structure and factors, which will govern the decision at present shareholders equity position, strengthen by retention of earnings.
Thus, the dividend decision has a bearing on the capital structure decision, the dividend policy of the firm should be considered the new financing decision of the firm might affect its debt equity mix.

NEED OF THE STUDY

The value of the firm depends upon its expected earnings stream and the rate used to discount this stream. The rate used to discount earning stream it's the firm's required rate of return or the cost of capital. Thus, the capital structure decision can affect the of the firm either by changing the expected earnings of the firm, but it can affect the residue earnings of the shareholders. The effect of leverage on the cost of capital is not very clear. Conflicting opinions have been expressed on this issue. In fact, this issue is one of most continuous areas in the theory of finance, and perhaps more theoretical and empirical work has been done on this subject than any other. The existence of an optimum capital structure is beneficial for the organization.

SCOPE OF THE STUDY

A study of capital structure involves an examination of long term as well as short term sources that a company taps in order to meet its requirements of finance. The scope of the study is confined to the sources that INDIAN OIL CORPORATION tapped over the years under study. The purpose of the study is to analyze and to explore the present value of the shares.

OBJECTIVES OF THE STUDY

1. To study the capital structure of INDIAN OIL CORPORATION through EBIT-EPS analysis.
2. To study effectiveness of financing decision on EPS and EBIT of the firm.
3. To analyze the leverage analysis of the selected company.
4. To observe the financing trends during the period of 2016-2020.

RESEARCH METHODOLOGY

SOURCES OF DATA:
The primary source for the project is collected from Published annual reports of the company for the year 2018-2020.
Tools used:

- Ratio analysis
- Graphical analysis
- Year-year analysis

These tools access in the interpretation and understanding of the Existing scenario of the Capital Structure.

LITERATURE REVIEW

NIKHAT FATIMA**,** Global Journal of Finance and Management. ISSN 0975-6477 Volume 6, Number 8 (2014), pp. 771-776, Research India Publications.

A strong banking infrastructure plays a major role in supporting economic activity and meeting the financial needs of all the sections of society and thus contributed in the overall growth of the country. For the smooth flow of credit in an economy, it is essential that banks should be financially sound so as to meet the various requirements of other fields.
KMAUMITACHOUDHURY, CHANDANAGOSWAMI, MSMEs in India. SME Chamber of India. Retrieved from http://www.smechamberofindia.com/rol_of_sme_sector.aspx accessed on 20 June 2017.
Micro, small and medium enterprises have been an area of great research interest. Credit is reported as a crucial input for promoting the growth of the MSME sector. The paper aims at finding out the role of MSMEs in the development of an economy and the issues associated with institutional lending to MSMEs. The important factors that influence lending to MSMEs are competition among banks, legal framework, credit policies and lack of information about SME borrowers, firm characteristics and firm size. But interestingly, only a negligible number of MSMEs have registered with DICs till date. Also, very limited studies have been found on unregistered and informal MSMEs.

NEHA, DR.GURCHARAN SINGH, International Journal of Engineering Technology, Management and Applied Sciences February 2015, Volume 3 Issue 2, ISSN 2349-4476
The economic development of a country depends more on real factors such as the industrial growth & development, modernization of agriculture, expansion of internal trade and foreign trade. Decomposition analysis has been used to check the structural variability of asset portfolio of Scheduled Commercial Public Sector Banks in India. The study of portfolio behavior of scheduled commercial public sector banks is important as it is a significant explanatory factor for the magnitude and changes in the banking industry.

Data Analysis
EBIT LEVELS

Particulars	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Earnings Before Interest & Tax	514.5	484.75	509.61	765.05
Change	-	-(27.75)	-(2.39)	252.55
% Change	-	5.41%	0.466%	49.27%

Table 1: EBIT LEVELS DURING THE PERIOD FROM 2016-2020

DEGREE OF FINANCIAL LEVERAGE:

$$DFL = \frac{\%\ \text{Change in EPS}}{\%\text{Change in EBIT}}$$

The higher the quotient of DFL, the greater the leverage.
In this case
During 2016-2017, to 2017-2018 it is increasing because decrease in EBIT level.
During 2017-2018, to 2018-2020 it is decreasing because increase in EBIT level.

EBIT LEVELS

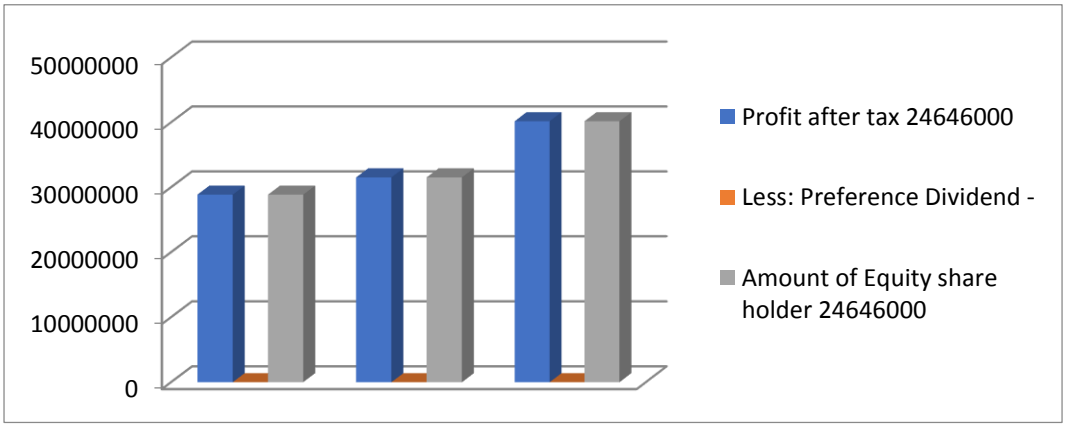


Figure 2

INTERPRETATION:

The EBIT level in 2017 is at 514.5 and is decreasing till the next year 2018. The EBIT levels in 2019 again started growing and reached to 509.61 and in 2020 were at 765.05.

PERFORMANCE:

EPS ANALYSIS

Particulars	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Profit after tax	24646000	28866000	31522000	40172000
Less: Preference Dividend	-	-	-	-
Amount of Equity share holder	24646000	28866000	31522000	40172000
No. Of Equity share	210680007	210680007	210680007	210680007
EPS	0.118	0.157	0.168	0.190

TABLE 2 : EPS ANALYSIS FROM THE PERIOD 2016-2020

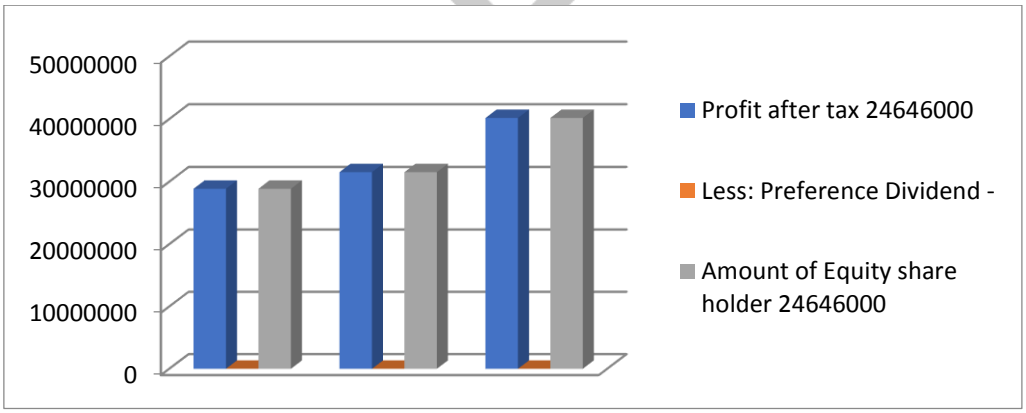
EPS (16-17) = 24646000/210680007 = 0.118

EPS (17-18) = 28866000/210680007 = 0.157

EPS (18-19) = 31522000/210680007 = 0.168

EPS (19-20) = 40172000/210680007 = 0.190

Figure 4.2: EPS LEVELS



INTERPRETATION:

The PAT is in increasing trend from 2016-2017.PAT has increased considerably, which leads to higher EPS, which is at 0.190 in 2020.

EBIT – EPS CHART

One convenient and useful way showing the relationship between EBIT and EPS for the alternative financial plans is to prepare the EBIT-EPS chart. The chart is easy to prepare since for any given level of financial leverage, EPS is linearly related to EBIT. As noted earlier, the formula for calculating EPS is

$$EPS = \frac{(EBIT-INT)(1-T)}{N} = \frac{(EBIT-INT)(1-T)}{N}$$

We assume that the level of debt, the cost of debt and the tax rate are constant. Therefore in equation, the terms (1-T)/N and INT (=iD) are constant. EPS will increase if EBIT increases and fall if EBIT declines.

FINDINGS

- The returns on net worth is high in the year 2020 by indicating 17% that the firm earned greater returns on the investment.
- From EBIT-EPS analysis EPS will be high when capital structure consists of 25% equity 75% debt capital.
- The EBIT level in 2017 is at 514.5 and is decreasing till the next year 2018. The EBIT levels in 2019 again started growing and reached to 509.61 and in 2020 were at 765.05.
- The PAT is in increasing trend from 2016-2017.PAT has increased considerably, which leads to higher EPS, which is at 0.190 in 2020.

SUGGESTIONS

1. The company has to maintain the optimal capital structure and leverage so that in coming years it can contribute to the wealth of the shareholders.

2. The company has to exercise control over its outside purchases and overheads which have effect on the profitability of the company.

CONCLUSION

Financial management is primarily concerned with the optimal use of finance - the most notable scarce resource in modern societies. All financing decisions aim at maximizing the return and minimizing the risk. To ensure this, each of the above decisions is related to the objectives of financial management. Capital structure decision is a significant decision. In organizations, increasing the proportion of debt - otherwise known as financial leverage - helps in bringing down the overall cost of capital because debt is the cheapest source of finance. Various theories on capital structure decision support this fact. For a firm one of the most important financing decisions is to choose between the most appropriate level of debt and equity in its capital structure. Excess use of debt may endanger the very survival of a firm, on die other hand, a conservative policy may deprive its equity holders a higher return on their investments as debt is considered a relatively cheaper source of finance.

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Zero Waste: A Novel Way of Waste Management

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Abstract: **Concept of zero waste is designing and managing processes and products to avoid and eliminate the volume of waste produced and to conserve and recover the resources without harming the environment in any way. By implementing the strategies of zero waste, elimination of discharge to land water or air can be achieved and ecosystem as a whole will be benefited.**

Keywords: **zero waste, reduction, reuse, recycling, recovery, compost, biogas.**

Introduction:
Unwanted materials of no use are generated in almost all activities of mankind and are to be disposed off as these are considered as wastes. In daily life vegetable peelings, fruit cores, skin and fat trimmed off meat, fish etc, bottled ingredients, cans etc generate waste which needs to be segregated and disposed off with a scientific approach. A waste hierarchy has been developed by scientists, which can be applied to help reduce, reuse or recycle the solid waste. A new concept of zero waste has come up and has gained phenomenal response across the globe over the past two decades. The term zero waste was coined in a small town in New Zealand at the zero waste conference held at Kaitaia in December 2000.The campaigner was Warren Snew. The term became viral on internet and gained momentum. The environmentalists became vocal about the concept and started advocating the concept of zero waste or no waste. Cradle to grave is a model where materials begin with the extraction of resources and after production and manufacture ends in a grave. Zero waste is a concept based on cradle to cradle principle. The cradle to cradle principle is based on redesigning industries so that the byproducts produced are recycled and reused leaving no waste. The system is gradually evolving to practice from theory. Chemists are working on the concept of zero waste and to reduce waste. Green chemists have incorporated zero waste concepts as one of the twelve principles of green chemistry.
Scientists have worked on the principles of '*3 Rs*' i.e. reduction, reuse and recycling along with recovery and disposal and the favored options have been charted out on the waste hierarchy to be followed.

Waste Reduction:
Waste reduction is at the top of the hierarchy, as it is the most effective way to limit the health and environmental impacts of the waste, as to create no waste is the best way to reduce waste. Waste reduction is important at household level in day to day basis also. It can be achieved by educating householders through house visits by experts and by educating people in community gatherings. In many cities it has resulted in behavioural changes among community members. Target of waste reduction has been taken up by NGOs and private sector enterprises with the support of government agencies. Educational campaigns are undertaken to raise awareness of the economic incentives and to reduce stigma attached to working with waste. In any industry to make a new product, material and energy is the prerequisite. Raw materials after extraction from earth are processed and after manufacturing the product is packaged and transported to be sold. All these stages produce solid waste, liquid waste and air pollutants. Green chemists are finding out and working on new innovative processes that can be adopted to effectively reduce the waste and pollutants and in process reduce pollution, save natural resources, protect the environment and are economically effective. Some of the simpler ways to reduce waste are listed here:

a) Using less packaging material and buying in bulk
b) Use of reusable rather than disposable items e.g. rechargeable cells and refillable ink pens.
c) Use of own shopping bags, preferably made of cloth or recycled materials

Waste Reuse:
The second option in waste hierarchy is waste reuse. The process of using a waste product without any change in its original nature and its shape is termed as waste Reuse. Bottles, old clothes and books are most easy reusable. Reuse is very helpful for disadvantaged people who cannot afford to buy new goods. Reuse centers are created at local levels which collect and distribute reusable goods. This also provides community benefits as long term unemployed and disabled people can be trained for the job .By reusing products rather than creating new products burden on economy is lessened as there is reduction in raw materials and products import. Reusing lowers the inputs of water, energy and other resources and thus is an environmental friendly approach.

Waste Recycling:
Recycling waste incorporates reprocessing of the material before being used to make new products. Activities involved in reprocessing can impact health and environment of people associated with the activity .It is to be weighed whether these impacts are lower or the impact if new products from new raw materials are manufactured .It is important to find a market for the new product that is manufactured from the waste otherwise the process will not be economically viable and sustainable. The recycling process to be undertaken depends on the type of waste, so it is important to segregate the wastes .Segregated waste can be put to different uses for example, waste paper can be pulped and new paper for printing and packaging obtained. Waste metals can be melted and new sheets and ribbons obtained. Plastic bottles can be ground and ropes and plastic coatings for various purposes

obtained. Organic waste including the waste obtained from kitchen and all biodegradable waste can be used to get compost. the composting can be done at commercial level as well as in small scale, this helps not only in reduction of waste but also in improving the quality of soil and added advantage is that chemical fertilizer use can be lessened .For composting ideally three parts of brown waste is mixed with one part of green waste .Brown waste is hay, straw, egg shells, woody material etc and green waste is animal waste, food waste dried leaves, grass etc. Composting is usually done in a pile; it is an aerobic process and hence needs to be turned upside down number of times so that oxygen is mixed thoroughly. Once the composting process is complete the raw materials can not be identified.

Recovery

Recovery is the fourth option in waste hierarchy. Here some use for the waste is found so that some value can be recovered; usually this is attained by using the waste as a source of energy. In developed countries energy is recovered from waste on a large scale, for this high technology incineration plants are used. It requires highly developed infrastructure i.e. a reliable source of waste, good transportation facility, a power distribution grid etc. Biogas production is also undertaken on large as well as small scale from organic biodegradable waste. Biogas production makes use of anaerobic digestion process. Biogas reduces the use of wood fuel, it is a clean fuel, and it does not pollute the environment and has a good calorific value. Additional benefit is that it contributes in reducing the green house gases. In this process sludge is obtained as a byproduct which can be used as a fertilizer as it is known to improve soil quality. To operate a biogas plant more equipment and expertise is needed.

Thus waste hierarchy is a guide to select to select the best option and strategy to dispose of waste. The management intervention can be undertaken keeping energy and environmental benefits in mind. This involves chemists in designing processes and products that will reduce or totally eliminate the waste formed that would otherwise be needed to be thrown away later .For achieving the target of zero waste, commitment is needed from industrialists and laws are needed to be framed by government agencies. Compulsory audit for various manufacturing units should be undertaken. The free tool for the same is provided by US Environmental Protection Agency. It can be included as one of the good business practices

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