Vetiveria zizanioides can prevent soil erosion and is also helpful in rehabilitating metal-polluted soil 3. Traditionall y, the plant is used for aromatherapy, for stress, anxiety, nervous tension and insomnia 4. Vetiveria zizanioides

Vetiveria zizanioides

Vetiveria zizanioides plant and to evaluate its antioxidant potential.

MATERIAL AND METHOD

Extract preparation

In the presentstudy 1gm of *Vetiveria zizanioides was added in ml of distilled water and boiled for -1 minutes at 3 degree Celsius. After boiling, the plant extract was filtered by Whatman No filter pape r. 2 ml of milli molar silver nitrate was prepared in 1 ml of conical flask 0 ml of filtered plant extract was mixed to it and kept in a magnetic stirrer for nanoparticle synthesis. Colour change was observed after nanoparticle synthesis (figure). The synthesized nanoparticle was preliminarily analysed using UV visible spectroscop y. Prior to the final step, the nanoparticle solution was centrifuged at 4 rpm to prepare nanoparticle pellet powder it was dried in a hot air oven at 4 degree Celsius. The dried powder was sent for characterisation. Finally the left over solution was taken to evaluate its antioxidant activity. All the results were taken photographs and recorded in the excel sheets.*

Figure 1: Figure represents the colour change observed after nanoparticle synthesis.

Antioxidant assay-DPPH method

DPPH assaywas used to test the antioxidantactivity of biogenic synthesized silver nanoparticles. Diverse concentrations 2-10 g/ml of *Vetiveria zizanioides plant extract interceded silver nanoparticles were mixed with ml of . mm DPPH in methanol and 01 l of 1 mm Tris HCl buffer (pH 3.0) and incubated for minutes. Later, the reduction in the quantity of DPPH free radicals was assessed dependent on the absorbance at 13 nm. HT was employed as control. The percentage of inhibition was determined from the following equation,*

/ inhibitionAbsor bance of control- Absor bance of test sample Absorbance of control

RESULTS

The percentage of inhibition of silvernanoparticles synthesised from *Vetiveria zizanioides was 02.5/ for L, 12.5/for L, 2.1/for L, 23/for 0L and 3.0/for 1L. The percentage of inhibition of the standard was 32.12/for L, 34.1/for L, 41.2/ for L, 44.24/for 0L and 5.1/for 1L. Hence maximum inhibition was observed at 1L that is at higher concentration (Table)(Figure). The silver nanoparticles synthesised from Vetiveria zizanioides have good antioxidant activity and are comparable to the standard.*

Table 1: The table represents the antioxidant activity of silver nanoparticles synthesised from *Vetiveria zizanioides* **compared to the standard.**

No.	Concentration	Standard- % of Inhibition	Silver nanoparticles-% of Inhibition
1	10µL	.5	.9
2	20µL	.52	5.9
3	30µL	5.3	1.5
		.	.
		.1	.

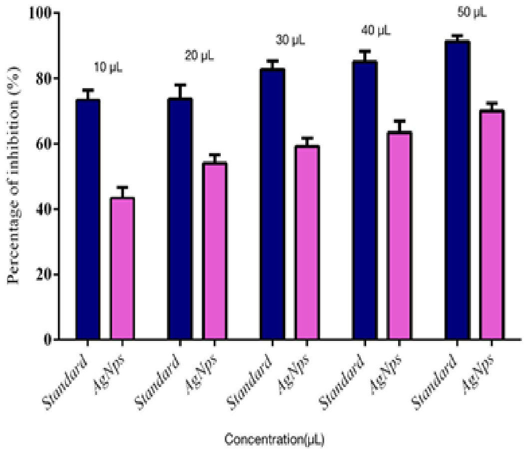

Figure 2: The graph represents the antioxidant activity of silver nanoparticles synthesised from *Vetiveria zizanioides* by calculating the percentage of inhibition at different concentrations compared to the standard. Blue colour represents the silver nanoparticles synthesised from *Vetiveria zizanioides*. Orange colour represents the standard. Maximum inhibition was observed at 50µL that is at higher concentration.

DISCUSSION

revious research wor s have reported on the various activities exhibited by the nanoparticles synthesised from natural sources such as cytotoxic and antimicrobial activity 2 . In a study silver nanoparticles were synthesized from a ueous leaf extract of Cestrum nocturnum and its antioxidant and antibacterial activities were tested. The bacteriostatic and bactericidal activity of silver nanoparticles against bacteria Escherichia coli Enterococcus faecalis and Salmonella typhi was determined using bacterial growth inhibition method. The resultsÃÏÎÆÉÒÍÅÄ ÔÈÁÔ ÔÈÅ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÈÁÖÅ ÍÏÒÅ ÁÎÔÉÏØÉÄÁÎÔ ÁÃÔÉÖÉÔÙ ÁÓ ÃÏÍÐÁÒÅÄ ÔÏ ÖÉÔÁÍÉÎ #8 !ÎÔÉÏØÉÄÁÎÔ ÁÎÄ ÁÎÔÉÂÁÃÔÅÒÉÁÌ ÁÃÔÉÖÉÔÙ ÏÆ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÉÓ ÄÕÅ ÔÏ ÔÈÅ ÐÒÅÓÅÎÃÅ ÏÆ ÂÉÏÁÃÔÉÖÅ ÍÏÌÅÃÕÌÅÓ ÏÎ ÔÈÅ ÓÕÒÆÁÃÅ8

3ÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ×ÅÒÅ ÓÙÎÔÈÅÓÉÓÅÄ ÉÎ Á ÓÔÕÄÙȟ ÕÓÉÎÇ ÁÎ ÁÑÕÅÏÕÓ ÅØÔÒÁÃÔ ÏÆ ÔÈÅ .ÅÐÅÔÁ ÄÅÆÌÅÒÓÉÁÎÁ ÐÌÁÎÔ8 (ÕÍÁÎ ÃÅÒÖÉÃÁÌ ÃÁÎÃÅÒ ÃÅÌÌÓ ×ÅÒÅ ÕÓÅÄ ÔÏ ÔÅÓÔ ÔÈÅ ÁÎÔÉÃÁÎÃÅÒ ÁÃÔÉÖÉÔÙ ÏÆ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÓÙÎÔÈÅÓÉÓÅÄ ÆÒÏÍ .ÅÐÅÔÁ ÄÅÆÌÅÒÓÉÁÎÁ8 4ÈÅ ÃÙÔÏÔÏØÉÃ ÒÅÁÃÔÉÏÎ ×ÁÓ ÆÏÕÎÄ ÔÏ ÂÅ ÃÏÎÃÅÎÔÒÁÔÉÏÎ ÄÅÐÅÎÄÅÎÔ8 !ÃÃÏÒÄÉÎÇ ÔÏ ÔÈÅ ÒÅÓÕÌÔÓȟ ÔÈÅÒÅ ×ÁÓ ÁÌÓÏ Á ÓÕÂÓÔÁÎÔÉÁÌ ÒÉÓÅ ÉÎ 2/3 ÁÎÄ ÌÉÐÉÄ ÐÅÒÏØÉÄÁÔÉÏÎȟ ÁÓ ×ÅÌÌ ÁÓ Á ÄÅÃÌÉÎÅ ÉÎ --0 ÁÎÄ ÇÌÕÔÁÔÈÉÏÎÅ ÌÅÖÅÌÓ8 "ÉÏÓÙÎÔÈÅÓÉÓÅÄ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÃÁÕÓÅÄ ÃÅÌÌ ÄÅÁÔÈ ÉÎ (Å,Á ÃÅÌÌÓȟ ÉÍÐÌÙÉÎÇ ÔÈÁÔ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÈÁÖÅ ÁÎÔÉÃÁÎÃÅÒ ÃÁÐÁÃÉÔÙ8 !Ó Á ÒÅÓÕÌÔȟ ÔÈÅÙ ÃÁÎ ÂÅ ÕÓÅÄ ÔÏ ÔÒÅÁÔ ÔÈÅ ÃÅÒÖÉÃÁÌ ÃÁÎÃÅÒ ÃÅÌÌÓ ɍυσɎ8

)Î ÆÕÔÕÒÅȟ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÂÉÏÓÙÎÔÈÅÓÉÓÅÄ ÆÒÏÍ *Vetiveria zizanioides can be assessed for its anticancer,* ÁÎÔÉȤÉÎÆÌÁÍÍÁÔÏÒÙȟ ÁÎÔÉÆÕÎÇÁÌ ÁÎÄ ÁÎÔÉÂÁÃÔÅÒÉÁÌ ÁÃÔÉÖÉÔÙ8 4ÈÅ ÓÔÕÄÙȭÓ ÌÉÍÉÔÁÔÉÏÎ ×ÁÓ ÔÈÁÔ ÉÔ ×ÁÓ ÃÏÎÄÕÃÔÅÄ ÉÎ ÖÉÔÒÏȟ ÓÏ ÉÔ ÃÁÎÎÏÔ ÂÅ ÁÓÓÕÍÅÄ ÔÈÁÔ ÔÈÅ ÒÅÓÕÌÔÓ ÏÆ ÁÎÔÉÏØÉÄÁÎÔ ÁÃÔÉÖÉÔÙ ÃÏÕÌÄ ÂÅ ÔÒÁÎÓÌÁÔÅÄ ÉÎÔÏ ÃÌÉÎÉÃÁÌ ÅÆÆÅÃÔÉÖÅÎÅÓÓ8

CONCLUSION

The silver nanoparticles biosynthesised from *Vetiveria zizanioides have good antioxidant activity. e can* ÃÏÎÃÌÕÄÅ ÔÈÁÔ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÁÒÅ Á ÐÏÔÅÎÔ ÁÎÔÉÏØÉÄÁÎÔ ÁÇÅÎÔ8 3ÉÎÃÅ ÉÔ ÓÈÏ×Ó Á ÇÏÏÄ ÁÃÔÉÖÉÔÙ ÉÎ ÆÒÅÅ ÒÁÄÉÃÁÌ ÓÃÁÖÅÎÇÉÎÇȟ ÆÕÒÔÈÅÒ ÓÔÕÄÉÅÓ ÃÁÎ ÂÅ ÄÏÎÅ ÏÎ ÓÉÌÖÅÒ ÎÁÎÏÐÁÒÔÉÃÌÅÓ ÆÏÒ ÉÔÓ ÃÌÉÎÉÃÁÌ ÔÈÅÒÁÐÅÕÔÉÃ ÁÐÐÌÉÃÁÔÉÏÎ8

CONFLICT OF INTEREST

The author declares that there is no ÃÏÎÆÌÉÃÔ ÏÆ ÉÎÔÅÒÅÓÔ ÉÎ ÔÈÅ ÐÒÅÓÅÎÔ ÓÔÕÄÙ8

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7Å ÓÉÎÃÅÒÅÌÙ ÓÈÏ× ÇÒÁÔÉÔÕÄÅ ÔÏ ÔÈÅ ÃÏÒÒÅÓÐÏÎÄÉÎÇ ÇÕÉÄÅ ÆÏÒ ÐÒÏÖÉÄÉÎÇ ÉÎÓÉÇÈÔÓ ÁÎÄ ÅØÐÅÒÔÉÓÅ ÔÈÁÔ ÇÒÅÁÔÌÙ ÁÓÓÉÓÔÅÄ ÔÈÅ ÒÅÓÅÁÒÃÈ8

FUNDING SOURCE

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Ɛ 3ÁÖÅÅÔÈÁ $ÅÎÔÁÌ #ÏÌÌÅÇÅ 3)-!43ȟ 3ÁÖÅÅÔÈÁ 5ÎÉÖÅÒÓÉÔÙ8

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3ÙÁ#ÉÕÄÄÉÎ !ħ3ÁÌ ÍÉÁÔÉħ3ÁÌÉÍ - 2ø ÅÔ ÁÌø ! ÒÅÖÉÅ× ÏÆ ÓÉÌÖÅÒ ÎÁÍÏÐÁÒÒÔÉÃÌÅÓą 2ÅÓÅÁÒÃÈ ÒÒÅÎÁÖħ ÇÌÏÂÁÌ ÃÏÎÓÕ ÍÐÔÉÏÎħ ÓÙÎÔÒÈÅÓÉÖħ ÐÒÏÐÅÒÔÉÅÖħ ÁÎÄ #ÕÖÕÒÅ ÃÈÁÌÌÅÎÇÅÓą ! ÒÅÖÉÅ× Ï# ÓÉÌÖÅÒ ÎÁÍÏÐÁÒÔÉÃÌÅÓø * #ÈÉÎ #ÈÅÍ 3ÏÄ çπρχ¶ φτ∂χσςζχυφø

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ςπø $ÁÖÉÄ !ħ 7ÁÎÇ &ħ 3ÕÎ 8ħ ÅÔ ÁÌø #ÈÅÍÉÃÁÌÃÏÍÐÏÓÉÔÉÏÎħ ÁÎÔÉÏØÉÄÁÎÔħ ÁÎÄ ÁÎÔÉÍÉÃÒÏÂÉÁÌÁÔÔÅÍÐÔÓ ÏÆ 6ÅÔÉÓÅÓ ¡,8Q ÎÁÓÈø)ÎÄÉÁÎ * "ÉÏÈÅÅÍ "ÉÏÐÈÙÓ çππω¶ τφ∂ρςςζ ρςυø

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ςυø - ÏÈÁÐÁÔÒÁ 3ħ ,ÅÀÌÁÖÁÔÈÉ ,ħ 2ÁÉÅÁÓÈËÕÍÁÒ 3ħ ÅÔ ÁÌø !ÓÓÅÓÓÍÅÎÔ ÏÆ ÀÙÔÏÔÏØÉÃÉÔÙħ ÁÎÔÉΖÉÎÀÍÍ ÍÁÔÒÌÒÙ ÁÎÄ ÁÎÔÉÏØÉÄÁÎÔ ÁÃÔÉÖÉÔÙ ÏÆ ÚÉÎÀ ÏØÉÄÅ ÎÁÎÏÐÁÒÒÉÃÌÅÓ ÓÙÎÔÈÅÓÉÚÅÄ ÕÓÉÇ ÀÌÏÖÄ ÁÎÄ ÃÉÎÎÁÍÍÔÉÓ ÍÒÏÍÁÔÉÏ Î ΖÁÎ ÉÎÇÕÉÔÒÏ ÓÕÖÄÙø * %ÖÏÌ - ÅÄ $ÅÎÔ 3ÃÉ çπςπ¶ ωζ∂ρψυωø

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ςχø 7Õ 3ħ 2ÁÉÅÓÈËÕÍÁÒ 3ħ - ÁÄÁÓÁÍÙ - ħ ÅÔ ÁÌø 'ÒÅÅÎ ÓÙÎÔÈÅÁÉÓ ÏÆ ÄÏÐÐÅÒ ÎÁÎÏÐÁÒÒÉÃÌÅÓ ÕÓÉÎÇ #ÉÓÓÕÓ ÖÉÔÉÇÉÎÅÄ ÁÎÄ ÉÓÓ ÁÎÔÉÏØÉÄÁÎÔ ÁÎÄ ÁÎÔÉÃÅÁÃÔÅÒÉÁÌ ÁÃÔÉÖÉÔÙ ÁÇÁÉÎÔÔ ÕÖÉÎÁÒÙ ÒÒÁÃÔÉÓÉÎÆÅÃÔÉÔÙ ÐÁÒÈÏÇÅÎÉÓø ! ÒÒÆ #ÅÌÌÓ .ÁÎÏÍÅÄ "ÉÏÔÅÃÈÎÌÏÌ çπςπ¶ τψ∂ρρυσζ ρρυψø

ςψø 2ÁÉÁËÕÍÁÒÉ 2ħ 6ÏÌÏÖÁ 4ħ /ÌÕ×ÁÆÅÍÉ /3ħ ÅÔ ÁÌø 'ÒÁÐÅ ÓÅÅÄ ÅØÔÒÁÃÔÓζÓÏÌÕÐÌÕÓ ÄÉÓÐÅÒÓÓÉÏÎ ÁÎÄ ÉÓÓ ÁÎÔÉÏØÉÄÁÎÔ ÁÃÔÉÖÉÔÙø $ÒÕÇ $ÅÄ)ÎÄ 0ÈÁÒÍ çπςπ¶ τφ∂ρςρωζρςςωø

ςωø 0ÓÉÎÃÅÐÏÎ "ħ 3ÁÎÔÈÁËÕÍÁÒ 0ħ 0ÒÁÔÈÁÐ ,ø ! ×ÁÒÅÎÅÓÓ ÏÎ ÐÒÄÓÅÎÔÉÓÅ ÍÅÁÓÕÒÅÓ ÔÁËÅÎ ÂÙ ÈÅÁÌÔÈ ÃÁÒÅ ÐÒÏÆÁÓÓÉÏÎÁÌ ÁÔÔÅÎÄÁÎÔ ÓÔÕÄÅÎÔ#/6)$Ζρω ÐÁÔÉÅÎÔÓ ÁÍÏÎÇ ÄÅÎÔÁÌ ÓÔÕÄÅÎÔÓø %ÕÒ * $ÅÎÔ çπςπ¶ ρτ∂3ρπυζ3ρπωø

σπø - ÁÔÈÅ× - 'ħ 3ÁÍÕÅÌ 32ħ 3ÏÎÉ !*ħ ÅÔ ÁÌø %ÖÁÌÕÁÔÉÏÎ Ï Æ ÁÄÈÁÓÉÏÎ Ï Æ 3ÔÒÅÐÔÏÃÏÃÃÕÓ ÍÕÔÁÎÓħ ÐÌÁÑÕÅ ÁÃÃÕÍÓÉÏÎ ÏÎ ÚÉÒÄÏÉÁ ÁÎÄ ÓÓÁÉÎÁÓÓ ÓÔÅÎÌÀÓÓ ÒÕÉÔÙ Í ÏÀÁÓÓą 2ÁÎÄÏ ÍÚÚÅÄ ÃÏÎÔÉÎÕÏÔÕÓ ÐÒÓÉÓÔÅÎÔ ÍÉÎÉÍÁÌ ÍÉÎÏÒ ÍÏÄÉÆÉÃÁÔÉÏÎÓ çπςπ¶ ςτ∂σςχυζσςψπø

σρø 3ÓÉÄÈÁÒÁÎ 'ħ 2ÁÍÁÎÉ 0ħ 0ÁÔÁÍÈÉÁÒ 3ħ ÅÔ ÁÌø %ÖÁÌÕÁÔÉÏÎ Ï Æ ÓÁÌÈÖÁÒÙ ÍÅÔÁÂÏÌÏÍÉÃÓ ÍÉÃÒÏÂÉÁÌ ÍÉÇÒÁÔÉÏÎ ÁÎÄ ÔÈÅÒÁÐÅÕÔÉÃ ÁÐÐÒÌÁÃÈÓø)Î Ô * - ÎÌ 3ÃÉ çπρφ¶ ρχ∂ρυστø

ÆÉÂÒÏÓÉÓ / ÒÁÌ / ÎÃÏÌ çπçρ] ρπυσωπ

συ (ÁÎÎÁÈ 2 2ÁÍÁÎÉ 0 4ÉÌÁËÁÒÁÔÎÅ 7 - ÅÔ ÁÌ #ÒÉÓÉÃÃÌ ÁÐÐÒÓÁÉÓÁÌ Ï Ä ÉÆÆÅÒÅÎÔ ÔÒÉÇÇÅÒÉÎÇ ÐÁÔÈ×ÁÙÓ ÆÏÒ ÔÈÅ ÐÁÔÈÏÂÉÏÌÏÇÙ Ï ÐÅÍÐÈÉÇÔÓ ÖÕÌÇÁÒÉÓ! ÒÅÖÉÅ×Ô / ÒÁÌ $ÉÓÅÁÓ çπçρ

σφ #ÈÁÎÄÒÁÓÅËÁÒ 2 #ÈÁÎÄÒÁÓÅËÈÁÒ 3 3ÕÎÄÁÒÉ ++3 ÅÔ ÁÌ $ÅÖÃÌÏÐÍÁÎÔ ÁÎÄ ÖÁÌÉÄÁÓÉÏÎ Ï Á Æ ÏÍÍÒÁÌ Æ ÏÎÎÅÅÅÔÖÅ ÁÓÓÅÓÍÅÎÔ Ï Æ ÃÅÒÉÃÁÌ ÖÅÒÔÅÁÌ ÖÅÒÔÅÅÁÌ ÂÏÎÅ ÁÇÅ 0ÒÏÇ / ÒÔÈÏÄ çπçπ] ρρ¢σψ

σχ 3ÕÂÒÁÍÎÙÁÍ $ 'ÒÒÕÎÁÔÈÁÎ $ 'ÁÁÙÁÔÈÒÉ 2 ÅÔ ÁÌ #Ï ÍÐÁÒÁÔÉÖÅ ÅÖÁÌÒÁÔÉÏÎ Ï Æ ÓÁÌËÖÁÒÙ ÍÁÌÏÎÄÉÁÌÄÅÙÄÅ ÌÅÖÅÌÓ ÁÓ Á ÍÁÒËÅÒ Ï Æ ÌÉÐÉÄ ÐÅÒÏØÉÄÁÔÉÏÎ ÉÎ ÅÁÒÌÙ ÄÈÉÑÁÔÉÓ %ÕÒ * $ÅÎÔ çπρψ] ρς¢φχζχπ

σψ *ÅÅÖÁÎÁÎÄÁÎ 'Å 4ÈÏ ÍÁÓ %8 6ÏÌÕÍÅÔÉÁ ÎÁÌÙÓÉÓ Ï Æ ÈÁÎÄÅ ÒÅÃÉÐÒÏÄÁÔÍÇ ÁÎÄ ÒÏÔÔÙ ÉÎÓÔÕÍÅÎÔ ÔÅÈÎÍÑÕÁÓ ÉÎ ÐÒÉÍÁÙ Í ÌÌÁÒÓ ÕÓÉÇ ÓÐÉÓÁÌ ÃÏ ÍÐÕÔÅÄ ÔÏ Í ÏÇÒÁÐÈÙ¢ ! Î ÉÎ ÖÉÔÒÏ ÃÏ ÍÐÁÒÁÓÉÓÅ ÓÔÕÄÙ %ÕÒ * $ÅÎÔ çπρψ] ρς¢ρχζχπ

σω 0Ï Î ÎÒÌÁÉÓÉÈ Í É 2 3ÈÙÁ ÍÁÌÁÄÅÓÉ "Å 6ÉÉÁÙÁÌÁÉÓÉÈ Í É 0 ÅÔ ÁÌ)Î ÓÉÌÉÃÏ ÁÎÄ ÉÎ ÖÉÖÏ ÁÎÁÌÙÓÉÓ ÔÏ ÉÄÅÎÔÉÆÙ ÔÈÅ ÁÎÔÉÄÉÁÂÅÔÃ ÁÃÔÉÖÉÔÙ Ï Æ ÂÅÔÁ ÓÉÔÍÓÅÒÏÎ ÉÎ ÁÄÉÐÏÓÅ ÔÉÓÕÖÅ Ï Æ ÈÉÇÈ Æ ÁÔÅÔ ÁÎÄ ÓÕÃÒÏÓÅ ÉÎÃÕÃÅÄ ÔÙÐÅζς ÄÉÁÂÅÔÃ ÅØÐÅÒÉ Í ÅÎÔÁÌ ÒÁÔÓ 4ÏØÉÃÏÌ - ÅÃÈ - ÅÔÈÏÄÓ çπρω] çω¢çχφζωπ

τπ 3ÕÏÄÁÒÁ Í 2 . ÁÎÄÈÁËÕÍÁÒ %Å (ÁÓÅÅÎÁ "ÁÎÕ (8 (ÅÓÐÅÒÉÄÉÎÅ Á ÃÉÔÒÕÓ Æ ÌÁÖÏÎÏÉÄ ÁÍÄÌÏÒÁÔÉÓ ÈÙÐÅÒÇÙÙÃÅÍÉÁ ÂÙ ÒÅÇÕÌÁÔÉÎÇ ËÅÙ ÅÎÚÙÍÅÓ ÏÆ ÃÁÓÂÁÍÉÙÄÒÁÔÉÓ ÍÅÓÁÇÉÓ ÁÎÄ ÓÕÃÒÏÓÅ ÉÎ ÓÕÒÐÕÏÚÏÔÏÃÎÇ ÉÎÃÕÃÅÄ 4ÏØÉÃÏÌ - ÅÃÈ - ÅÔÈÏÄÓ çπρω] çω¢φττζφυσ

τρ !ÌÓÁ×ÁÌÈÁ - 2ÁÏ #6 !ÌZ3ÕÔÁÉÅ ! - ÅÔ ÁÌ . ÏÖÀÌ ÍÁÔÈÅÍÁÔÉÃÁÌ Í ÏÄÅÌÌÉÎÇ ÏÆ 3ÁÕÄÉ !ÒÁÂÉÁÎ ÎÁÔÕÒÀÌ ÄÉÁÔÏ Í ÉÔÅ ÃÌÁÙ - ÁÔÅÒ 2ÁÓ %ØÐÒÁÓÓ çπρω] φ¢ρπυυσρ

τς 9Õ *Å ,É - :ÈÁÎ $Å ÁÌ)ÎÈÉÂÉÔÏÒÙ ÅÆÆÅÃÓÓ Ï Æ ÔÒÉÔÅÒÐÅÎÏÉÄ ÂÅÔÕÌÉÎ Ï Î ÉÎÆÌÁ Í Í ÁÔÏÒÙ Í ÄÄÉÁÔÏÒÓ ÉÎÄÕÇÉÅÌÀ ÎÉÔÓÉÄ ÏØÉÄÄ ÓÙÎÔÈÁÓÅÌ ÙÙÅÌÏÏØÙÇÁÎÁÓÅζçÅ ÔÕ Í ÏÒ ÎÃÙÏÓÉÓ ÆÁÃÔÏZÁÌÐÈÁÅ ÉÎÔÓÒÌÃÕËÉÎζφÅ ÁÎÄ ÐÒÏÍÉÆÅÒÁÔÉÇ ÃÅÌÌ ÎÕÃÌÁÁÒ ÁÎÔÉÇÅÎ ÉÎ ρÅ çζ

ÄÉ Í ÅÔÈÙÌÈÙÄÒÁÚÉÎÅZÉÎÄÕÃÅÄ ÒÁÔ ÃÏÌÏÎ ÃÁÒÃÅÉÎÏÇÅÎÔÁÓÉÓ 0ÈÁÒ Í ÁÃÏÇÎ - ÁÇ çπçπ] ρφ¢ψσφ

τσ 3ÈÒÅÅ + (Å 2Á Í ÁÎÉ 0 3ÈÁÒÌÉÎ (Å ÅÔ ÁÌ 3ÁÌÉÓÁ ÁÓ Á ÄÉÁÇÎÏÓÔÉÃÀ ÔÏ ÏÌ ÉÎ ÏÒÁÌ ÓÑÕÁ Í ÏÕÓ ÃÀÌÌ ÀÁÒÃÉÎÏ Í ÁzÁ ÓÙÓÔÅ Í ÁÔÉÃÀ ÒÅÖÉÅ× ×ÉÔÈ Í ÅÔÁ ÁÎÁÌÙÓÉÓ 0ÁÔÈÏÌ / ÎÃÏÌ 2ÅÓ çπρω] çυ¢τ τχζτυσ

ττ :Á£ÁÒ !Å 3ÈÅÒÌÉÎ (*Å *ÁÙÁÒÁÉ 'Å ÅÔ ÁÌ $ÉÁÇÎÏÓÔÉÃÕÔÉÌÉÔÙ Ï Æ ÔÏÕÃÈ ÉÍÐÒÉÎÔ ÃÙÔÌÏÇÙ Æ Ï ÉÎÔÒÉÎÇÙÉÎÔÈÅ ÓÔÒÕÇÉÃÁÌ Í ÁÒÇÉÎÓ ÁÎÄ ÓÁÎÔÉÎÁÌ ÌÙÍÐÈ ÎÏÄÁÓ ÉÎ ÏÓÁÌ ÓÑÕÁ Í ÏÕÓ ÃÀÌÌ ÃÁÒÃÅÎÏ Í Á ÐÁÔÉÅÎÔÓÙ ÕÓÉÇ Æ ÏÖÉÇÎ ÄÉÆÆÅÒÅÎÔ ÕÅÒÏÇ ÁÎÄ ÓÙÎÔÈÅÔÉÃ ÓÙÎÔÈÅÔÉÃ çπçπ] τψ¢ρπρζρπ

τυ +ÁÒÕÎÁÇÁÒÁÎ - Å - ÕÒÁÌÉ 0 0ÁÌÁÎÉÁÐÐÁÎ 6 ÅÔ ÁÌ %ØÐÒÙÁÓÉÉÎÎ ÁÎÄ ÄÉÓÔÒÙÉÂÕÔÉÎÎ ÐÁÔÔÅÒÎ Æ ÐÏÄÌÉÐÁÎÉÎ ÉÎ ÏÓÁÌ ÓÕÂÍÕÓÁÍÉÎÇ ÄÅÇÒÅÅ ÓÕÐÅÒÖÉÓÉÓ ×ÉÔÈ ÖÁÔÙÉÎÇ ÄÅÇÒÅÅ ÄÙÓÐÌÁÓÉÁzÁÎÉÍÍÕÎÏÔÉÄÅÎÇ ÅÄÇÒÅÅ ÓÕÐÅÒÖÉÓÉÓ çπçρ] ρχ¢çρçσζçρçφ

τχ 2ÁÊ 0ÒÅÅÔÈ $ 3ÁÒÁÖÁÎÁÎ 3 3ÈÁÉÒÁÍ - Å ÅÔ ÁÌ "ÉÏÁÃÔÉÖÅ :ÉÎÃj))Q ÃÏ ÍÐÌÅØ ÉÎÃÏÒÐÏÒÁÔÄÅ 0#,Æ ÇÀÌÁÖÉÎ ÀÌÅÃÔÒÏÓÐÕÎÎ ÎÁÎÏÉÆÂÅÒ ÅÎÈÁÎÃÅÅ ÂÏÎÅ ÔÉÓÓÕÅ ÒÀÇÂÎÅÒÁÔÉÏÎ %ÕÒ * 0ÈÁÒÍ 3ÁÉ çπçρ] ρφπ¢ρπυχφψ

τψ 0ÉÔÈÉÓÉÒÁÉ .Å 9ÁÎÇ '%Å 4ÈÁÎÇÁÖÀÌÕ ,Å ÅÔ ÁÌ ! ÎÔÉÃÁÎÅÀÒ ÃÏ ÍÐÏÕÎÃÁÓ ÆÒÏ Í ÓÔÁÒÆÉÓÈ ÒÀÇÂÎÅÒÁÔÉÎÇ ÔÉÓÓÕÅÓ ÁÎÄ ÒÈÆÉÒ ÁÎÔÉÏØÉÄÁÔÎ ÐÒÏÐÅÒÔÉÅÓ ÒÒÏÐÅÒÔÉÅÓ ÏÎ ÈÍÁÎ ÏÒÁÌ ÅÐÉÄÅÒÍÏ ÍÉÄ ÃÁÒÃÅÎÏÍ ÍÁ +" ÃÅÌÌÓ)Îq 0ÁÎÅÒÅÁÓ ,ÉÐÐÉÎÃÏÔÔ 7 ÉÌÌÉÁÍÓ Q 7 ÉÌÌÉÎÔÓ 4×Ï #Ï Í ÍÅÒÅ 31 çπçπ] ρυυζφ

τω ÈÔÔÐ¢ZZÂÂÒÃ Æ ÎZÂÂÒÃZ×ÐZÃÏ ÎÔÅÎZÔÑÐÌÏÁÄÓZ çπçπZpπZρσZ . / ZχρZ3ÐÅÃÉÁÌZ)ÓÓÕÅZπρτ Æ ÐÃ

υπ #ÈÅÌÌÁÐÁ ,2 3ÈÁÎ Í ÕÇÁÍ 2)ÎÁÉÒÁÎ - ! Å ÅÔ ÁÌ "ÉÏÇÅÎÉÁ ÎÁÎÏÓÁÌÅÎÉÕ Í ÓÙÎÔÈÅÓÉÓ ÉÕÓ ÁÎÔÉ Í ÉÃÒÏÏÂÉÁÌ ÁÎÔÉÏØÉÄÁÎÔ ÁÃÔÉÖÉÔÙ ÁÎÄ ÔÏØÉÃÉÔÙ "ÉÏÉÎÓÐÉÓÅÄ "ÉÏ Í É Í .ÁÎÏÂÉÏ Í ÁÔÅÒÉÁÌÓ çπçπ] ω¢ρψτζρψω

υρ - ÅÎÏÎ 3 ! ÇÁÒ×ÁÌ (Å 2ÁÉÅÓÈËÕ Í ÁÒ 3 Å ÅÔ ÁÌ)ÎÕÅÓÉÇÁÓÉÎÇ ÔÈÅ ÁÎÔÉ Í ÉÃÒÏÏÂÉÁÌ ÁÃÔÉÖÉÔÉÅÓ ÏÆ ÔÈÅ ÂÉÏÓÙÎÔÈÅÓÉÚÄÄ ÓÅÌÅÎÉÓ Í ÎÁÎÏÉÄÁÔÉÓ ÁÎÄ ÉÓÓ ÔÅÓÔÉÓÁÌ ÁÎÁÌÙÓÉÓ "ÉÏ ÎÁÎÏÉÓÅ çπçπ] ρπ¢ρςçzρσυ

υς 3ÁÒÁÖÁÎÁËÕ Í ÁÒ +Å #ÈÅÌÌÉÁÉ 2 - ÕÂÁÒÁË ! ÌÉ $Å ÅÔ ÁÌ 5 ÎÖÄÉÌÉÎÇ ÔÈÅ ÐÏÔÅÎÔÉÁÌÓ Ï Æ ÂÉÏÃÏ Í ÐÁÔÉÁÌÅ ÓÉÌÖÀÒ ÎÁÎÏÉÐÁÔÓÉÁÌÅÓ ÏÎ ÈÕÍÁÎ ÌÒÎÇ ÃÁÒÅÎÏÍ Á !υτω ÃÅÌÌÓ ÁÎÄ (ÅÌÉÁÏÁÁÃÔÂÒ ÐÙÌÌÓÉ 3ÁÉ 2ÅÐ çπρω] ωρζψ

υσ !ÌZ3ÈÅÄÄÉ %3 &ÁÒÓÈÏÖÉ . Å !ÌZ/ÑÁÉÌ - Å ÅÔ ÁÌ ! ÎÔÉÃÁÎÁÅÒ ÐÏÔÅÎÔÉÁÌ Ï Æ ÇÒÅÅÎ ÓÙÎÔÈÅÓÉÚÅÄ ÓÉÌÖÀÒ ÎÁÎÏÉÐÁÓÔÉÀÓ ÕÓÉÇ ÅØÔÒÃÃÅÒ Ï Æ . ÅÐÅÔÁ ÄÄÆÌÀÒÓÉÁÎÁ ÁÇÁÉÎÓ ÈÕÍÁÎ ÃÅÒÖÉÃÁÌ ÃÁÎÅÒ ÃÅÌÌÓ j(Å, !Q "ÉÏÉÎÏÒÇ #ÈÅÍÉ !ÐÐ çπρψ] çπρψ