!

!!!!!!

The Problem of Weed Control in Newly Established Native Plantings!

"#$!%& ' ($)&$*!+ , $(#-!" . /0($*!1-2)(, !3 , /4& 5 ' #*!

! ! ! !

! "#$%& ' (&) ' *+%*+ ,&

! ! ! !

-.%/0+12%&30 4 4 "56&&

!

@(9:!1,/9:A)!B,/5($0!4-(5,9#*!-,$=)4,7#!/#C#0#9,9(&$!()!D#2!9&!/#=.4($0!EF?!#5())(&$)*!($4/#,)($0!'(&=(C#/)(92*!,$=!7/#)#/C($0!4.-9./,-!(57&/9,$4#%!1<<#49(C#!B##=!4&$9/&-!()!D#2!9&!9:#!).44#))!&<!9:#)#!/#C#0#9,9(&$!#<<&/9)%!

H:

! ! ! ?

!

! ! !

!

! ! ! S

!

! ! !

!

9 : #!7/#7 , /#=!N . #)9(&$)!9&!#- , ' &/ , 9#!&$!4#/9 , ($!=#9 , (-)*!9#--!)9&/(#)! , $=!7/&C(=#!$#B!($<&/ 5 , 9(&$!0J/ , $4#)! #9! , -0*!?XXZP0!H : #!N . #)9(&$)!<&/!($9#/C(

! ! !]

!

!

A8&B1+%5"+05%&C%21%D&

H:()!)#49(&$!).55,/()#)!9:#!-(9#/,9./#!/#C(#B!&$!9:#!9&7(4!&<!B##=!4&$9/&-!($!$,9(C#!7-,$9($0)6!!

A>78&E$"*+1*@&E$"**1*@&"*:&31+%&E5%F"5"+1'*&

%,7(=!,4:(#C#5#$9!&<!,!=#$)#!4,$&72!()!C(9,-!,)!(9!/#=.4#)!).$-(0:9!<&/!B##=!0/&B9:!0+,C()!c!;#./D*!?XX>^!8.--(C,$!#9!,-6*!?XXZP*!,$=!($4/#,)#)!$,9(C#!7-,$9!0/&B9:!/,9#)!'2!7/&C(=($0!B($=!):#-9#/!,$=!,!0&&=!5(4/&4-(5,9#!0W/,99*!>ZZ_^!8.--(C,$!#9!,-6*!?XXZP6!W-,$9($0!=#$)#-2!B,)!9:#!D#2!5#9:&=!9:,9!,--&B#=!,!4,$&72!9&!<&/5!N.(4D-2!0+,C()!c!;#./D*!?XX>^!8.--(C,$!#9!,-6*!?XXZP6!!

H:#!&$-2!)&(-!4:,/,49#/()9(4!,==/#))#=!($!9:#!-(9#/,9./#!B,)!)&(-!4&57,49(&$6!89.=(#)!<&4.))#=!&$!)7#4(<(4!)7#4(#)!,$=!):&B#=!9:,9!9:#/#!()!C,/(,9(&$!,5&$0)9!$,9(C#!7-,$9)!($!9:#(/!9&-#/,$4#!9&!)&(-!4&57,49(&$!0b$9&$!#9!,-6*!?X>[^!",))#99!#9!,-6*!?XX[^!8.--(C,$!#9!,-6*!?XXZP6!+#)7(9#!9:()*!8.--(C,$!#9!,-6!0?XXZP!,$=!+,C()!c!;#./D!0?XX>P!'&9:!4&$4-.=#=!9:,9!7-,$9($0!($!/(77#=!)&(-)!B,)*!($!0#$#/,-*!,!0&&=!5#9:&=!<&/!)(9#!7/#7,/,9(&$!<&/!$,9(C#!7-,$9)6!H:#!-&&)#!)&(-!#$4&./,0#)!/&&9!=#C#-&75#$9!,$=!4,$!($4/#,)#!0/&B9:!/,9#)!B:(4:!,--&B)!<&/!,!N.(4D#/!4,$&72!4/#,9(&$6!!!!

H:#/#!B,)!4-#,/!4&$)#$).)!($!9:#!

!

!

)9#5!</&5!7,)9./#)!4&$9,($($0!,!5(I9./#!&<!=(<<#/#$9!B##=!)7#4(#)!B:(4:!B(--!/#,49!=(<<#/#$9-2!9&!9:#!:#/'(4(=#!.)#=!0"&./=j9!#9!,-G*!?XXaP*!B:(4:!:(0:-(0:9)!9:#!$##=!<&/!)7#4(#)L9,/0#9#=!)7/,2!4&$9/&-G!

A>J8&B1+%5"+O5%&K*'D$%:@%&L"F,&

8(0$(<(4,$9!D$&B-#=0#!0,7)!B#/#!<&.$=!=./($0!9:#!-(9#/,9./#!/#C(#BG!;.4:!&<!9:#!-(9#/,9./#!&$!)(9#!7/#7,/,9(&$!<&4.)#=!&$!($=(C(=.,-!)7#4(#)G!H:#/#!B,)!$&!-(9#/,9./#!&$!)&(-!4:,/,49#/()9(4)!&9:#/!9:,$!4&57,49(&$!,$=!(9)!#<<#49)!&$!$,9(C#!7-,$9)G!H:#!-(9#/,9./#!B,)!.$4-#,/!&$!:&B!),<#!4-,))(4,-!'(&-&0(4,-!4&$9/&-!()!9&!.)#!($!Q#B!R#,-,$=G!;&)9!&<!9:#!-(9#/,9./#!&$!5.-4:#)!,$=!5,99($0!B,)!-(5(9#=!($!=#9,(-!,$=!7/(5,/(-2!/#-,9#=!9&!.),0#!<&/!C#0#9,'-#!4/&7)!,$=!<&/#(0$!7-,$9)*!5,D($0!(9!=(<<(4.-9!9&!,77-2!9&!$,9(C#!7-,$9)G!;#4:,$(4,-!4&$9/&-!-(9#/,9./#!-,/0#-2!<&4.)#=!&$!)7#4(<(4!)(9#)!B(9:!.$(N.#!7:2)(4,-!4:,/,49#/()9(4)!,$=!B##=)*!5#,$($0!9:,9!-(5(9#=!($<&/5,9(&$!4&.-=!'#!=/,B$!&.9!,$=!,77-(#=!9&!9:()!/#)#,/4:G!H:#!5&)9!)(0$(<(4,$9!-(9#/,9./#!0,7!B,)!:&B!:#/'(4(=#)A!#$C(/&$5#$9,-!#<<#49)!4,$!'#!5(9(0,9#=!&/!7/#C#$9#=!,$=!9:#!4.-9./,-!(57-(4,9(&$)!&<!B##=!4&$9/&-G!

!

H8&9*+%521%D&C%,0$+,&"*:&M1,/0,,1'*&&

FC#/,--*!9:#!<($=($0)!B#/#!)(5(-,/!9&!.!-(9#/,9./#!/#C(#BG!Q&C#-!<($=($0)!B(--!'#!=()4.))#=!($!9:#(/!/#-#C,$9!)#49(&$)G!F$#!$#B!,$=!7/#C(&.)-2!.$4&$)(=#/#=!<($=($0!B,)!9:#!=#'',9#!,/&.$=!9:#!/&-#!&<!4&55.$(92!#$0,0#5#$9!($!B##=!4&$9/&-G!8&5#!($9#/C(#B##)!'#-(#C#=!:,$=LB##=($0!B,)!9&&!-,'&./L($9#$)(C#!,$=!9(5#!4&$).5($0!4&57,/#=!9&!)7/,2)!,$=!5.-4:#)*!B:(-#!&9:#/)!4&$)(=#/#=!(9!,!C,-.,'-#!B,2!9&!($C&-C#!9:#!4&55.$(92!B:(4:!4&.-=!'#!-&BL4&)9!(<!C&-.$9##/)!B#/#!($C&-C#=G!H:()!=()=(),0/##5#$9!5,2!'#!=.#!9&!7#/)&$,-!C,-.#)

!

!

)9&7!/#0/&B9:G!H:()!()!(57&/9,$9!<&/!7#/#$$(,-)*!,)!9:#2!,/#!4,7,'-#!&<!C#0#9,9(C#!/#7/&=.49(&$G!
H:#/#<&/#*!/#0.-,/!4.99($0!9#4:$(N.#)!B(--!$&9!($<-.#$4#!7#/#$$(,-)!=.#!9&!9:#(/!,'(-(92!9&!/#0/&B!9:#(/!
):&&9)G!

8(9#!)7#4(<(4,9(&$)!=#9#/5($#!B##=!4&$9/&-!9#4:$(N.#)!.)#=^!)#$)(9(C#!)(9#)!).4:!,)!,9!9:#!W&/9!3(--)!.)#!
7/(5,/(-2!5#4:,$(4,-!4&$9/&-!=.#!9&!9:#!#$C(/&$5#$9,-!#<<#49)!&<!4:#5(4,-!4&$9/&-G!;#4:,$(4,-!4&$9/&-!
&79(&$)!,/#!C#/2!($9#$)(C#*!'.9!9:#!-(9#/,9./#!):&B)!9:,9!(9!()!)9(--!7&))('-#!9&!4,//2!(9!&.9!#<<#49(C#-2G!
V$$&C,9(&$!()!D#2!9&!9,D#!9:#!:,/=!B&/D!&.9!&<!5#4:,$(4,-!4&$9/&-*!).4:!,)!'2!4/#,9($0!,.9&5,9#=!
/&'&9)G!;#4:,$(4,-!4&$9/&-!()!,-)&!5&/#!C(,'-#!,/&.$=!B,9#/B,2)!9&!5($(5()#!9:#!.)#!&<!4:#5(4,-!
4&$9/&-!0"&9,$()9*!7#/)&$,-!4&55.$(4,9(&$*!8#79#5'#/!>a*!?X?XPG!
!

H>H8&<O$/=%,&"*:&<"++1*@8&&

H:#!EEE!.)#)!)($0-#!.)#!5,9!)N.,/#)!9&!7/&9#49!9:#!',)#!&<!7-,$9)!
</&5!B##=)!0J(0./#!SP!0E&.$4(-!#57-&2##*!7#/)&$,-!4&55.$(4,9(&$*!
8#79#5'#/!>a*!?X?XPG!E&4&$.9!<('/#!()!$&B!,!7&7.-,/!4:&(4#!<&/!9:()*!
'.9!+FE!()!5&C($0!9&B,/=)!B&&-G!;.-4:#)!,/#!0&&=!<&/!5&()9./#!,$=!
B##=!).77/#))(&$!0Q./)#/2!#57-&2##*!7#/)&$,-!4&55.$(4,9(&$*!
8#79#5'#/!>Y*!?X?XP*!B:#/#,)!5,9!&79(&$)!4,$!'#!=#9/(5#$9,-!9&!
7-,$9)!'#4,.)#!&<!,!-,4D!&<!5&()9./#!(<!7-,4#=!&$!=/2!0/&.$=G!3#57!
<('/#!()!7/&C($0!9&!'#!,!.)#<.-!&79(&$*!'.9!=.#!9&!(9)!4&)9!(9!()!$&9!,!
0&&=!-,/0#L

!

! ! !

!

H>I8&)=%41/"$&)'*+5'$&

J&/!5&)9!($9#/C(#B##)*!4:#5(4,-!4&$9/&-!()!7/#<#//#=!&C#/!5#4:,$(4,-!4&$9/&-!&$!-,/0#!)(9#)!=.#!9&!9(5#!,$=!-,'&./!4&)9)*!'.9!4,/#<.-!,$=!9,/0#9#=!,77-(4,9(&$!()!4/.4(,-!9&!,C&(=!D(--($0!$,9(C#!7-,$9)!0Q./)#/2!#57-&2##*!7#/)&$,-!4&55.$(4,9(&$*!8#79#5'#/!>Y*!?X?XPG!b!$.5'#/!&<!5#,)./#)!4,$!'#!9,D#$!9&!/#=.4#!9:()!/()D!).4:!,)!&$-2!)7/,2($0!,9!-&B!B($=!C#-&4(9(#)*!7-,4($0!4&$#)!&C#/!9:#!7-,$9)*!4:#4D($0!<&/!'/,$4:#)!.$=#/$#,9:!5,99($0*!B##=($0!,/&.$=!9:#!7-,$9)!<(/)9!&/!4.99($0!,$=!7,)9($0!4:#5(4,-)!($9&!9:#!B#

! ! ! >X

!

! ! !

!

I8&304 4"56&"*:&)'*/$0:1*@&)'4 4%*+,&

W-,$9($0!=#$)#-2!($!/(77#=!)&(-)!B:#/#!C#0#9,9(&$!:,)!'##$!4-#,/#=!,77#,/)!9&!'#!9:#!'#)9!5#9:&=!<&/!)(9#!7/#7,/,9(&$G!W-,$9($0!:#,-9:2!7-,$9)!($4/#,)#)!0/&B9:!/,9#)*!

! ! ! >>

!

C%(%5%*/%,&

b$9&$*!\G!3G!0?X>[PG!8./C(C,-!,$=!0/&B9:!&<!7-,$9#=!)##=-($0)!&<!9:/##!$,9(C#!9/##!)7#4(#)!($!./',$!<&/#)9!/#)9&/,9(&$!($!@#--($09&$*!Q#B!R#,-,$=G!*New Zealand Journal of Ecology,* 0?P*!>aXL>aYG!

! ! !

!

! ! ! >S

!

! ! !

!

W/&))#/*!fG!bG*!@&&=)*!%G!%G*!3&/)B#--*!fG*!c!%&'($)&$*!"G!3G!O?X>_PG!H:#!7&9#$9(,-!($L)(9.!,$9(5(4/&'(,-!
,'(-(92!&<!;2/9,4#,#!7-,$9!)7#4(#)!&$!7,9:&0#$)!($!)&(-G!*Soil Biology and Biochemistry,* *!>LSG!
:997)KII=&(G&/0I>XG>X>_IiG)&(-'(&G?X>[G>?GXXa!

! ! ! >]

!

! ! !

!

OFF%* :1.&O8&9*+%521%D&Q0%,+1'*,&

The following are guiding

! ! ! >[

!

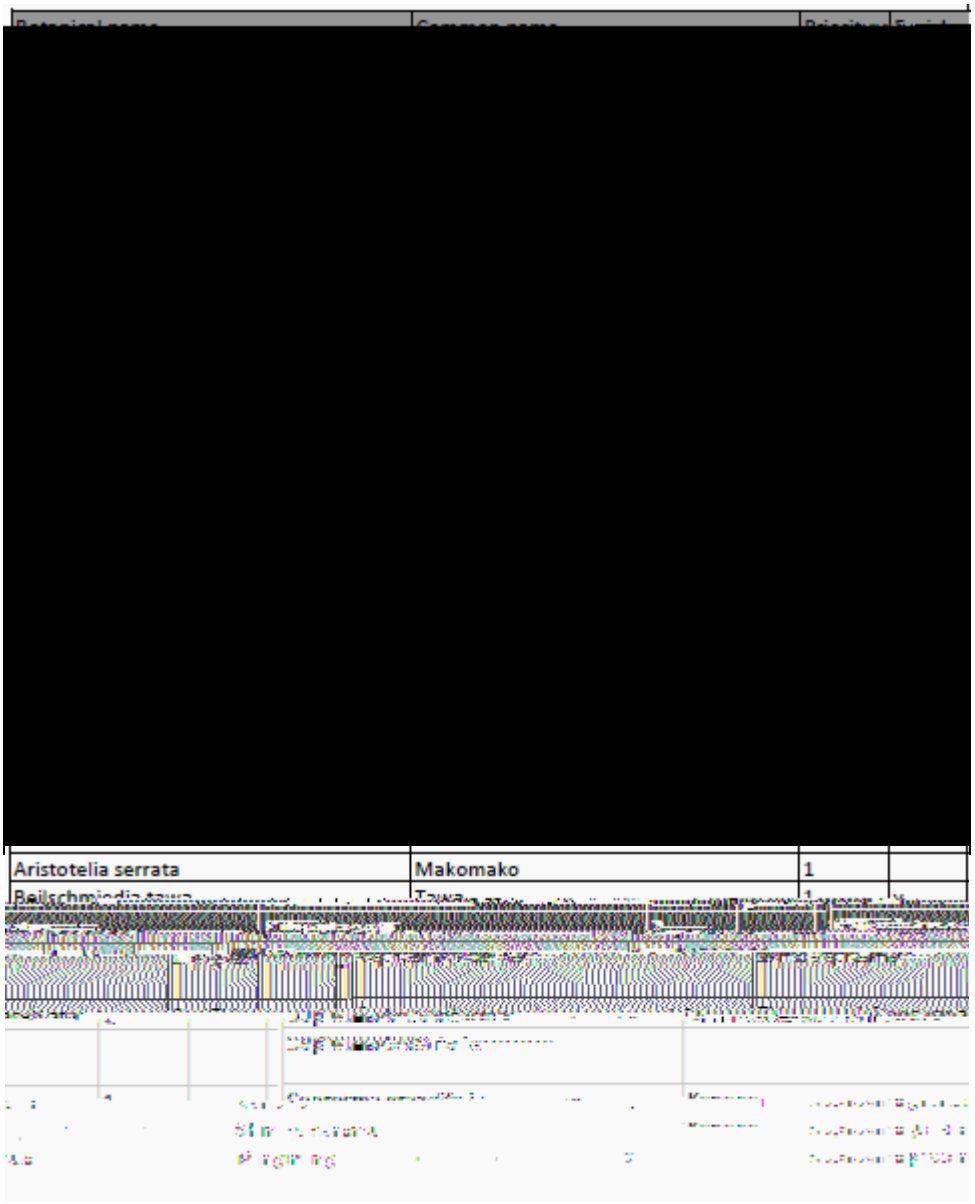
! ! !

!

OFF%* :1.&R8&3F%/1%,&B1,+&

b$!#I,57-#!&<!,!)7#4(#)!-()9!,9!,!)(9#!B:(4:!.)#=!).44#))(&$,-!7-,$9($0!9&!).77/#))!B##=)!0`,$=)4,7#!
b/4:(9#49*!7#/)&$,-!4&55.$(4,9(&$*!8#79#5'#/!>a*!?X?XPG!1$/(4:5#$9!)7#4(#)!,/#!($=(4,9#=!B(9:!,!y2A!($!
9:#!<,/L/(0:9!4&-.5$*!B:(-#!9:#!7/(&/(92!4&-.5$!($=(4,9#)!:&B!)&&$!)7#4(#)!):&.-=!'#!7-,$9#=6!

!



!

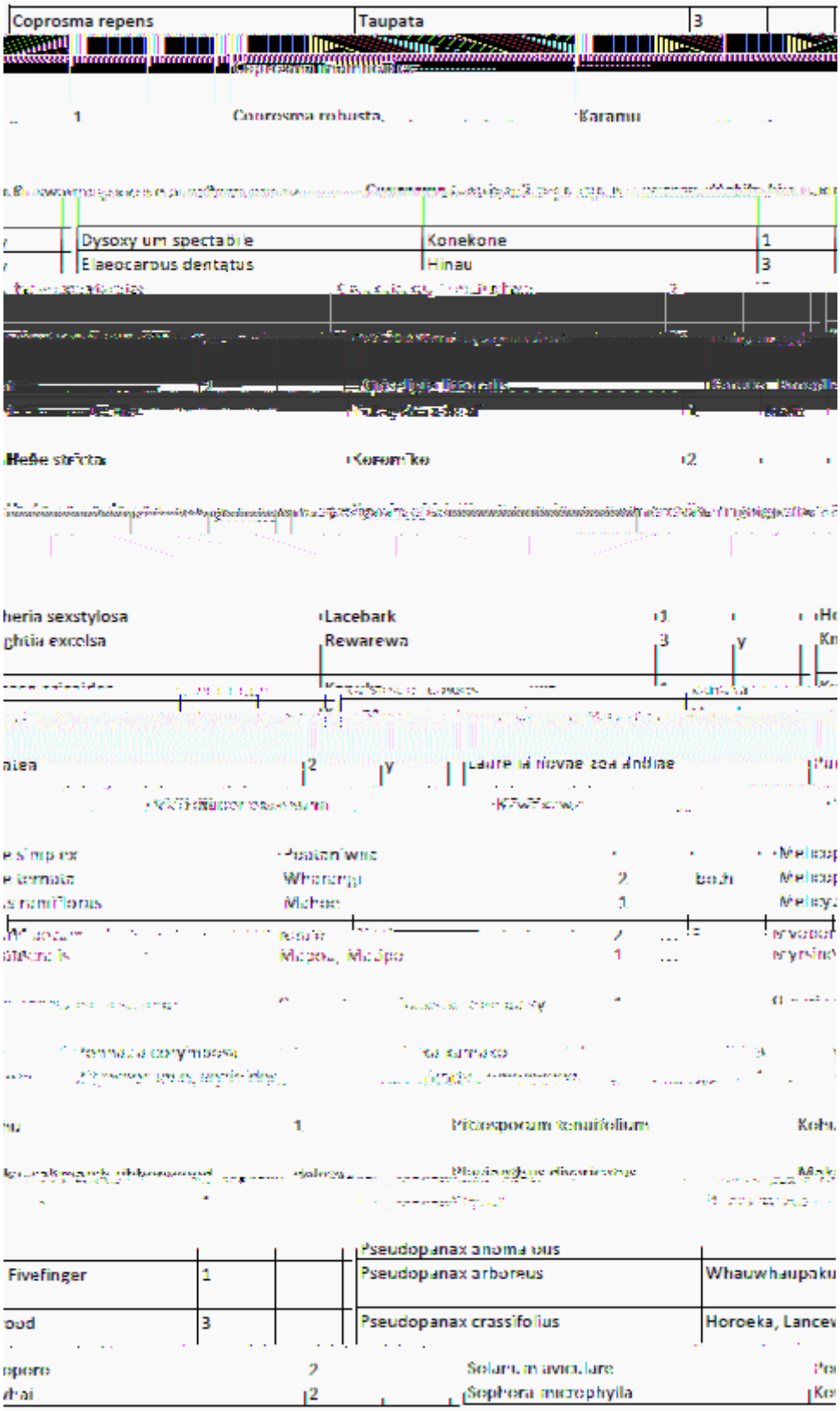
! &

! ! ! >_

!

! ! !

!


Coprosma repens
Taupata
3
1
Coprosma robusta
Karamu
Dysoxy um spectabile
Konekone
1
Elaeocarpus dentatus
Hinau
3
Lacebark
Rewarewa
Pseudopanax anomalus
Fivefinger
1
Pseudopanax arboreus
Whauwhaupaku
Pseudopanax crassifolius
Horoeka, Lancew
Solanum aviculare
Sophora microphylla

!! ! &

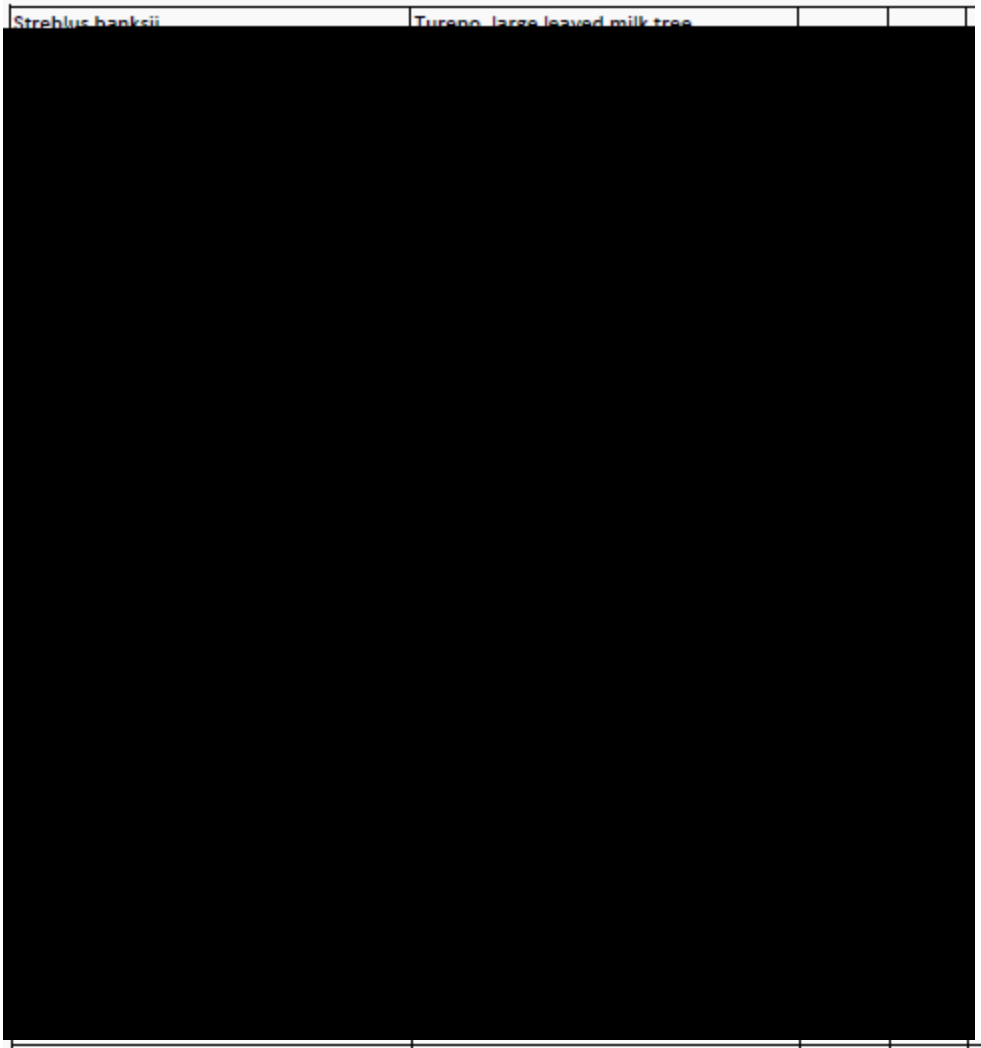
! ! ! >a

!

! ! !

!

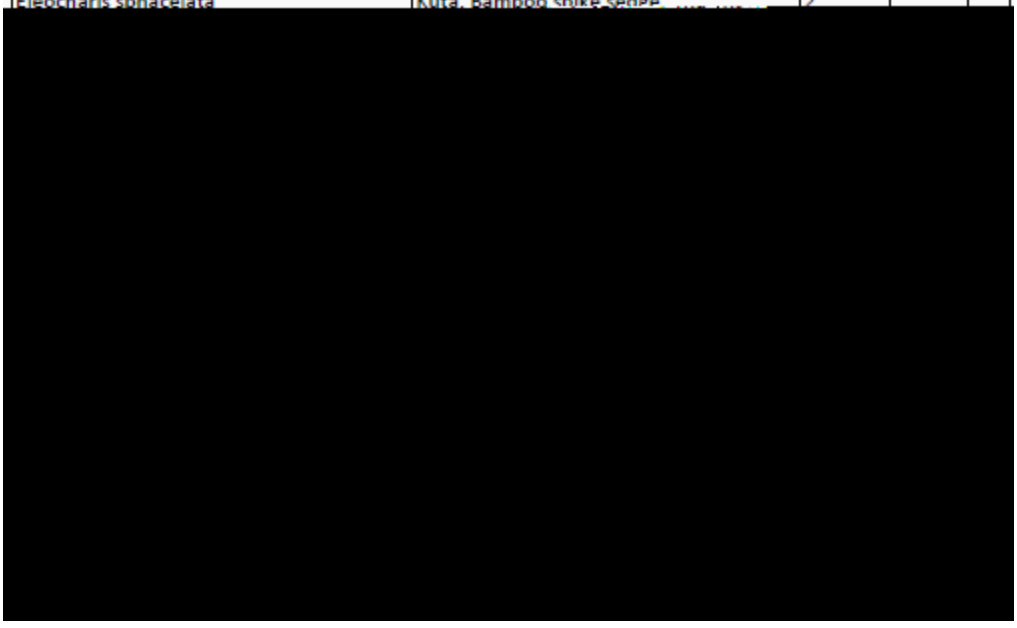
Streblus banksii	Turepo, large leaved milk tree			



!!

!

Eleocharis sphacelata	Kuta, Bamboo spike sedge	?		



! ! ! >Y

!

! ! !

!

!

! ! ! >Z

!