

Supplementary Figure 1. Stem-loop structures of 52 putative miRNA precursors.

JcumiRNA001 in *Hevea brasiliensis*

dG = -23.20

```

          10          20          30
      AG---          GACA    ---|  UUU
GGGUU    ACCGUCGUGA    GGUU  AGU  A
UCCAA    UGGUAGCGCU    CCAG  UCA  C
      CUUAA          GCG-    UAG^  UCC
          60          50          40

```

JcumiRNA002 in *Vitis vinifera*

dG = -30.4

```

          10          20          30          40
A    CGC-    AA  AUAA  C    |  GG
AAAGAU    GUGGCCU  UGG  GGCG  UCGC--CUCC  A
UUUUUA    CACUGGA  ACC    UUGC  AGCG  GAGG  G
G    CUUU    --  A---  U    \  ^  GC
.          90          80          (20nt side loop)

```

JcumiRNA003 in *Jatropha curcas*

dG = -31.10

```

          10          20          30
CC-    A  GUACCU    .-UG|  G
      UGCCUG  UUU    GACUCCACA  CAUU  C
      ACGGAU  GAG    CUGGGGUGU  GUGA  A
GUA    C  UCUC--    \  --^  C
          90          80          40

```

JcumiRNA004 in *Oryza sativa*

dG = -53.10

```

          10          20          30          40
A|    G          G          AGCUUGU  GGA
CGACG  GAUAUUGG  GCGGUUCAAUCAGAA  GCUCC  A
GCUGC  CUAUAACC  UGCCGAGUUAGUUUU  CGAGG  G
C^    A          G          CUCAUCU  AGC
          90          80          70          60          50

```

JcumiRNA005 in *Populus trichocarpapa*

dG = -28.0

```

          10          20          30          40
|    A  AUAG  U  GUAUU  CCU  G
AAGGUCGUUGU  GU  UGG  GA    CCCG  GUCAC  C
UUUUAGCGGCA  CG    GCC  CU    GGGC  CAGUG  G
^    A  -----  C  AGCUU  C--  G
.          70          60          50

```

JcumiRNA006 in *Strongylocentrotus purpuratus*

dG=-37.80

```

          10          20          30          40          50
      G  CA-    GAUA  -  -----|  C  UAU  U  U  CCA  AA
CCUAU  GG  UGGGC  UGG  GCAU    GGG  GA  GUC  GGUAG  GGU  AGGA  C
GGAUG  CC  ACCCG  ACC  CGUG    CCC  CU  UAG  UCGUU  UCA  UCCU  C
      G  ACC  GA--  A  UCAUCCCCCUUCU^  A  U--  -  -  CG-  GG
          120          110          100          90          80          70          60

```

Jcu-miRNA007 in *Euphorbia genistoides*

dG=-22.80

```

      10      20
|          U      U  AU
UAAAGGAGCAAUA CCAAUU CU  C
AUUUCCUCGUUUAU GGUUGG GA A
^
.  40    30

```

JcumiRNA008 in *Medicago truncatu*

dG = -18.1

```

      10      20      30      40      50
UCUC-|  UU  GU  UA  CUA  UUGAAUU  UA
AGA  UUUAU  GGCU  AAC  UAGUA  UGCUA  UAUGU  \
UCU  AAGUG  UCGG UUG GUCGU  AUGAU  AUACA  U
UACUC^  UU GC UG AG-  -----  UU
      90      80      70      60

```

JcumiRNA009 in *Jatropha curcas*

dG = -21.10

```

      10      20      30
A  CU---|  U  C U
  GGAU  UUG AUUCGGCUCAAUC UUU A
  CUUA  AAU UGAGCCGGGUUAG AAA G
A  ACGUU^  U  A  U
      60      50      40

```

JcumiRNA010 in *Arabidopsis thaliana*

dG = -30.1

```

      10      20      30      40      50      60
U  UG  U  AG--  CA  CGAAC-  .-AACUUUUUC|  U
  GGUC  GUC AUUUU  GUUUUU  CUAGC  AUUAAUGG  UCGGA  U
UCGG CGG UAAGA CAAGAG GAUUG  UGAUUGCC  AGCUU  U
G  --  U CAAA  UG  CAUUUAU  \  -----^  A
150  140  130  120  110  (40nt side loop)

```

JcumiRNA011 in *Vitis vinifera*

dG = -27.38

```

      10      20      30
  U AGGC  .-AACUGCUAU|  U
GUGG UCA GUAGCAUUGG  GUAGGC  U
CGCC AGU  CAUUGUAACC  CAUUUG  U
  -  -----  \  -----^  U
      100  (43nt side loop)

```

JcumiRNA012 in *Oryza sativa*

dG = -58.70

```

      10      20      30      40      50      60      70
U|          U  UU  A GC  UU  G  U  UUUU  GUUUA  CA
  UGUUUUUGGG GGAAUG GUCUGGUUC AG  CCC  AGGAU  UG  GAU  GAUG  UGCAUU  U
  AUAGAGACUC CCUAC CGGACCAGG UC  GGG  UUCUA  GC  CUA  CUAC  GCGUAG  C
G^          C  UU  C  UU  U-  G  U  U---  AA---  UU
      130      120      110      100      90      80

```

Osa-miR166e is labeled in blue.

JcumiRNA013 in *Populus trichocarpapa*

dG = -18.6

```

      10          20          30          40
      U UG AUCU  G   ---   .-UG|  AGG  G
CAUUUUUA U  U   GUU GAUA  AUGGUUCC  UUGG  GUU A
GUAAGAU  G  G   UAA UUGU  UAUUAAGG  GACU  UAA A
      U  GU  ----  G   GGA  \  --^  GUA  A
      100          90          80  (20nt side loop)

```

JcumiRNA014 precursor in *Oryza sativa*

dG = -44.10

```

      10          20          30          40          50
      A   UCG  GUUAA  CU   ---   .-GAA|  AC
GUGGU GAGCGG  GCU   CUGA  GGUC  GUAGGUUC  UCCU  \
UAUCG CUUGCC  UGG   GAUU  CCAG  CGUUCGGG  AGGG  U
      -   CAA  AUGAG  C-   UUU   \  ---^  GU
      140          130          120          110          (44nt side loop)

```

JcumiRNA015 in *Rattus norvegicus* (Mir3596a)

Initial dG = -34.20

```

      10          20          30          40
|   CU  G  U   UAGAGUUACA
UCCCAGG  GAG UAG AGGUUGUAUAGUU  \
AGGGUUC  UUC AUC UCCGACAUGUCA  A
^   CU  G  C   UAGAGGGAAC
80          70          60          50

```

JcumiRNA016 in *Mimulus guttatus*

dG = -47.40

```

      10          20          30          40
C-   CAC   G  .-UCC   .-CGAA|  AG
CGG  UCGCA  AUGUCA AC   CAUUGGA  GUAG  A
GCC  AGCGU  UGCAGU  UG   GUAAUCU  CAUC  C
      UA   U--   G  \  ---   \  ----^  GC
      .   180 (91nt side loop)  80   (24nt side loop)

```

JcumiRNA017 in *Oryza sativa* (Osa microRNA MIR457)

dG = -40.15

```

      10          20          30          40
CC   ACAA  GC  A   .   -A  GC-|  AC  CCA  UA
      AGACC  GCA  AGC  GCAG  GA  AUCUGG  CGU  AUC  C
      UCUGG  CGU  UCG  CGUC  CU  UAGACC  GCA  UAG  U
CU   ----  A-  -   \  ACCU-  AAU^  AU  ACC  CA
      170          (19nt side loop)  60          50

```

JcumiRNA018 in *Oryza sativa* (Osa microRNA 169c gene)

dG = -68.75

```

      10          20          30          40          50          60          70
-  AA  A-  A  A   UA   CA   .-AACUCCAA|  CGC  A
      CA  CGCU  GA  GA  GAGAGC  GGUGUAGCCAAGGA  GACUUGCCGGCU  GG  UUCAGC  \
      GU  GUGA  CU  CU  CUCUUG  CUACGUCGGUUCU  CUGAACGGCCGA  CC  GAGUCG  A
G  AC  CA  C  C   CC   A-  \  -----^  UUA  A
      140          130          120          110          100          (11nt side loop)

```

JcumiRNA019 in *Oryza sativa*

Initial dG = -48.70

```

          10          20          30
      G          U          .-AAA .-AGA|          UU
CUU GCCAUUUU GUUGCGUU          GC          AACAUUU \
GAG UGGUAAAC CGAUGUAG          CG          UUGUAAG G
      A          U          \ GGG- \ ---^          UU
190          180          (121nt side loop)          40

```

JcumiRNA020 in *Oryza sativa*

dG = -49.80

```

          10          20          30          40          50
      C          UUU          GC          .-U          .-UCA| UG          UUG
CU CUU          UUGGAU          UGAAGGUGAUUUU          UGUUGUUU          UC          CC          U
GA GAA          AACUUA          ACUUCCAUGAAG          ACAACAAA          AG          GG          C
      C          CGC          AA          \ -          \ ---^ GU          UCA
.          230          220          180 (112nt side loop)60

```

JcumiRNA021 in *Vitis vinifera*

dG = -38.08

```

          10          20          30          40          50          60          70          80          90          100
      - - - - UU          U          U          C          AC          G          UU- .-UUCGUUUUUUU| .-UUUUUCAUCGUUUUUUUUUUKUAUUCUUUUUUUC
UU
GAG GC UG GUU GGUG          AAU GGG          GCUAU CU          CUGA CUUU          UC          UUUUAUA
GUC \
CUC UG AC CAA CCGC UUG CCC UGAUG YA          GGCU GAGA          AG          AGAAUGU
CAG C
      U          U          U          C          CU          C          U          C          CC          Y          UAC \ -----^ \ -----
UU
250          240          230          220          210          (63nt side loop) 140          (23nt side loop)          110

```

JcumiRNA022 in *Vitis vinifera*

dG = -42.56

```

          10          20          30          40          50          60          70
      G- U          ACG          AUA          -          .-GAGGG| .-GGAAAAGGUAGAAG          G          GGGC
GGGG          CG          GUGCG          GGUG          GGUG          GGUCGUAU          GGGCG          GAU          UCA
G
CCCU          GC          CACGU          UCAC          CCAU CUAGCGUG          UCCGC          CUA          GGU
R
      AG          -          AA-          GA-          A          \ GG ---^          \ -----          G          GGGA
160          150          140          (30nt side loop) 100          (13nt side loop)          80

```

JcumiRNA023 in *Vitis vinifera*

dG = -66.90

```

          10          20          30          40          50
      |          U          G          AC          GG          -          GG          UACU          G          U
CGGGGGG CCCA UCCCGA          CCGUC          CUG          UCGGU          AC          CGG          CUGCUCUG \
GCUCCCC          GGGU          AGGGUU          GGCAG          GGC          GGCCG          UG          GCU          GGCGAGAGC          G
^          -          A          A-          GG          U          --          CGCU          G          G
110          100          90          80          70          60

```

JcumiRNA024 in *Jatropha curcas*

dG = -55.60

```

          10          20          30          40          50
C   U   -   -   GAUA   .-C|   UGAAGAA   GC
    GAC CUC GGCA ACG   UCUCGGCU   UCGCAUCGA   CGCA G
    CUG GGG CCGU UGC   GGAGCCGG   AGUGUGGUU   GCGU A
A U U C ACG-   \ -^   CAUA---   AA
          150          140          130 (57nt side loop) 60

```

JcumiRNA025 in *Solanum lycopersi*

dG = -27.40

```

          10          20          30          40
-   -   GC-| G G AAUA   GU   U
GC UCC ACUUG   UCG GG G   GCUCAGUUG AGAGC \
UG AGG UGGGC   AGC UU C   UGGGUUAAC   UCUCG C
  U   U   AUU^ G G ----   GU   C
  80          70          60          50

```

JcumiRNA026 in *Vitis vinifera*

Initial dG = -27.90

```

          10          20          30          40
U   -   UU   --   UUC   .-AUU -| C
GA UG AGUUC   GCCA   UAUUUUU   AGCAU   GG CAUA \
CU AC UCAAG UGGU GUAUGAA UCGUG   UC GUAU U
  U   G   --   UU   UUU   \ --- A^ C
          140          130          120(57nt side loop)

```

JcumiRNA027 *Oryza sativa* (microRNA 167d gene)

dG = -60.70

```

          10          20          30          40          50          60
U   UG AA   A   -   UG---|   GUUU   UAA
GUGC GCCA AG   GAUGAA CUGCCAG AUGAUCUGAU GCA   UCUCUAG   UG   A
CACG UGGU UC   CUACUU GACGGUC UACUAGACUA UGU   AGAGAUC   AC   U
-   GU AC   C   G   G   CAUCA^   GACU   UAC
          120          110          100          90          80          70

```

JcumiRNA027 *Oryza sativa* (microRNA 167e gene)

dG = -58.60

```

          10          20          30          40          50          60
U-   C-|   UUGUU   -   A C   AGC   AA AUCUC
  GUUAAUU   GCU   UGUGC GCCAU AG AGGUGAAGCUGCC   AUGAUCUGA   GC   \
  UAGUUAG   CGA   ACACG CGGUA UC UCUACUUCGACGG UACUAGACU CG   A
GU   UU^   CC---   A   C U   CC-   AG   ACCAA
.   120          110          100          90          80          70

```

JcumiRNA027 in *Populus trichocarpa*

dG = -26.1

```

          10          20          30          40
CAUG UG - U -   UCAAA AA .-A| AC

```

CCAGAU C GC AGC UC AACCUC CC CAU UCAA \

 GGUUUU G UG UCG GG UUGGAG GG GUA AGUU A

AAG- GU U U A UGAG- GG \ -^ AA

100 90 80 70(12nt side loop)50

JcumiRNA028 in *Jatropha curcas*

dG = -33.10

10 20 30

- AG- ---- AC .-C| CG A

GGA CCG UGCC UCCC GCC GGU U C

CCU GGU ACGG AGGG CGG CCA A U

A AAA CUGA AA \ -^ AU C

110 100 90 (45nt side loop)

JcumiRNA029 in *Vitis vinifera*

dG = -38.12

10 20 30 40 50 60

G CU U A .-UAGACACGCUG A-| CA GA-- AU UUC

CCG AUGG G AAUUGG CUCUU GGAAG GUGCUA GC CUCGG \

GGC UACC C UUAGCC GAGAA UCUUC UACGGU CG GAGCC G

G CU - - \ ----- AA^ -- ACGG GU UGA

150 140 (21nt side loop) 90 80 70

JcumiRNA030 in *Vitis vinifera*

dG = -24.20

10 20 30 40

U A - ---- A C A AG-- --| C

GAUAGG GUCA GU GGAA GU CGA GU UGC CUG AGG \

CUAUCC CAGU CA CCUU CA GUU CA AUG GAC UCC A

- A U GUUC A - G GCCA AA^ U

80 70 60 50

JcumiRNA031 in *Vitis vinifera*

dG = -67.30

10 20 30 40

G CGAA - -| U GA GA U

UCCCAGUCC CCC GUCGGC UG CGGUG CUGCUC GCUGC C

AGGGUCAGG GGG CGGCCG GC GCCGC GGCGAG CGGCG C

A CAGG C U^ - UG AG C

90 80 70 60 50

JcumiRNA031 in *Populus trichocarpa*

dG = -62.50

10 20 30 40

G CGAA - -| U GU GA GA U

UCCCAGUCC CCC GUCGGC UG CG G CUGCUC GCUGC C

AGGGUCAGG GGG CGGCCG GC GC C GGCGAG CGGCG C

A CAGG C U^ - UG UG AG C

90 80 70 60 50

JcumiRNA032 in *Oryza sativa*

dG = -18.90

10 20 30 40 50

U -| C UCCAAU AUUAAAAUAA - AG

```

AG GUUU CU UC          UCACAGAAAAU          GGC CCUG U
UC UAAA GA AG      GGUGUUUUUUG          UCG GGAC G
U      C^ U CCCGU--          CACAUUAA-- A CU
          90          80          70          60

```

JcumiRNA033 in *Oryza sativa*

dG = -19.80

```

          10          20          30
| UU A A U C AUUUU- UA
GA CC UGGU UGAUGG AA AGCAA UCA \
CU GG AUCG AUUACC UU UCGUUU AGU C
^ UG C G - A ACUGAU CU
          70          60          50          40

```

JcumiRNA034 in *Populus trichocarpa*

dG = -32.70

```

          10          20          30          40
A-      GGG-| CCAA UUAG CA C
CG GUUCUAUC UAAAG UGA AGG UCGGGGGCG \
GC CAGGAUGG AUUUC ACU UCC AGCUCCCGC A
GG AUAA^ AA-- CUUA -- A
          80          70          60          50

```

JcumiR035 in *Vitis vinifera*

dG = -40.60

```

          10          20          30          40          50          60
U      UU--- UGUU A .-U G UUGA U-- ---| C
AA
GAGGUAG GUU CA CAAGUAGC UGAUUUGAU CUUUUU GGUCAU GCUG UUA AC
\
CUUCGUC CAA GU GUUCGUUG ACUAGACUA GAAAAA CUAGUA CGAC AAU UG
U
C CCCUC UUGU G \ - - UAAA UUC UUA^ A
UC
          160          150          140 (23nt side loop) 100          90          80
70

```

JcumiR036 in *Vitis vinifera*

dG = -77.00

```

          10          20          30          40          50          60          70
A U- - GGAGA G C UA CGUUUGUGUU .-GA| AA GU
UGGG GGUUA AU GAA GG AUGGU UGAGCG GGAGU CGUGCGUGU UG G
ACCC CCAAU UA UUU UC UACCG ACUUGC CUUCA GUACGUACA AC A
A UU A AAGAG G - -- ----- \ --^ -- AA
          270          260          250          240 (147nt side loop)          80

```

JcumiR037 in *Vitis vinifera*

dG = -25.84

```

          10          20          30          40          50
UU AUUCCC - .-C CUCUUUUUCCUUU---| UU U A
GUGGG CG ACAG ACGGCG UGCUU AAU UAA ACG C

```

UACUC GC UGUC UGCUGC ACGAA UUG AUU UGC A
 UU CAUUU- U \ - UCCUCCCAAUAUCCUU^ UU U U
 170 160 150 (54nt side loop) 80 70 60

JcumiR038 in *Oryza minuta*

dG = -156.70

10 20 30 40
 GA-- - .-U - .-AAG --| G UU
 GCGCCGGGGAG GGUG GUGG GG GUGG GCAG CCGGGC GG \
 UGCGGCUCUUC UCGC CGCC CC CGCC UGUU GGCUCG CC G
 GAAG G \ - G \ --- UA^ G UG
 290 280 250 (54nt side loop) 60 50

JcumiR039 in *Vitis vinifera*

Initial dG = -79.60

10 20 30 40 50 60 70
 U U . -A .-AUC GG U --| UAGAA U GAAACUU AGCA
 AC
 GCU AUAUUA UUCAAA GAUGGC AAGGU A CAUG CCAAGG CU AUUGU CC
 ACU \
 UGA UGUAAU GAGUUU UUACCG UUCCG U GUAC GGUUCU GA UAACA GG
 UGA C
 C C \ ACCAU - \ --- RU - AG^ UAACA U GAUUAAC AAM-
 CA
 310 300 (169nt side loop) 120 110 100 90
 80

JcumiR040 in *Oryza sativa*

dG = -19.90

10 20 30
 | UA GAGGA
 AAAAAUAACAAAUUGAC UGAA C
 UUUUUUUAUGU UUAAAUG GCUU G
 ^ GC AAUUU
 . 50 40

JcumiR041 in *Vitis vinifera*

dG = -26.70

10 20
 U C C--| U
 GGAUGGG CGAC GGU CGCC C
 CCCUGCUC GCUG CCA GUGG G
 C U CGU^ C

. 40 30

JcumiR042 in *Vitis vinifera*

dG = -90.50

```

      10      20      30      40      50      60
A   AG RU RR G A CU CUR .-CCUU | A U GU
UUGCA GC CC CU GCCU UACU AU GGUCUC UGGGUG--GGA CCC AAGGC \
AACGU UG GG GA UGGA GUGA UA CUAGAG ACCCAU CCU GGG UUUCG G
A   G- UU AG - - UU --- \ ---- \ ^ A U AU
.   310      300      290(198nt side loop)80      70

```

JcumiR043 in *Vitis vinifera*

dG = -72.70

```

      10      20      30      40      50
UU   U--- UAGUU U .-GA| AAUAGC
GCA UUUAAAU GAGG GGUUGUGG GUA AGAUGAC U
CGU GGGUUUA CUCU CCAAUACU CAU UUUACUG C
UU   UUUU UUGAU U \ --^ AAUGCC
320      310      300      290(226nt side loop)

```

JcumiRNA044 in *Vitis vinifera*

dG = -60.04

```

      10      20      30      40      50      60      70      80
G   GAAC .-UUCUC - .-UUCAACCCA U CU .-AUG UCAACU | G A
CCA ACGCA UCGGA GCCG CCC GA CGC UCCAG GCCCAG UGGGA--CUU AGCUC \
GGU UGCGU AGUCU CGGC GGG CU GUG AGGUU UGGGUU ACCCU GAG UUGAG A
G GUCA \U----- U \ ----- U -- \ --- C----- \ ^ A C
270      260(35nt side loop)220 (53nt side loop) 160 (27nt side loop) 120 (20nt side loop) 90

```

JcumiRNA045 in *Arabidopsis thaliana*

dG = -75.90

```

      10      20      30
GAG GAC----- G .-CUC|GG G
UCCGGA GUCG CGGGGGC G AAGA U
AGGCCU CGGC GCCCCCG C UUCU U
AGG AAAAGUUCC G \ ---^UU A
160      150      140(131nt side loop) 40

```

JcumiRNA046 in *Populus trichocarpa*

dG = -19.40

```

      10      20      30
CU UU - GA- --| UU GA
GAA GU AC UGU UCAGUG UCGAGUUG GGU G
CUU UA UG GCA AGUCAU AGCUCGAC UCA U
UU U- C AAA UG^ -- AU
70      60      50      40

```

JcumiRNA047 in *Oryza sativa*

dG = -36.90

```

      10      20      30      40      50
A   AUC -- - - GA - C --| CCU
UCG GUG ACAAUGU CA UUGA GCU CAGGGACUG AC GGC CAGG \
AGC CGC UGUUGCA GU AACU CGA GUUCUUGAC UG CUG GUCU C
- GAC AC G C AC G A AA^ CUC
100      90      80      70      60

```

JcumiRNA048 in *Oryza sativa*

dG = -28.70

10 30

```

GGUC  A    C    .-CAUCAG|          GG
      AGA CAUCA CUCAC          GACCAUAAG A
      UCU GUAGU GGGUG          UUGGUUAUUC A
UUUU  A    A    \ -----^          AG
      80          70          40

```

JcumiRNA049 in *Oryza sativa*

dG = -30.70

```

      10          20          30
| AUU  U  -    U CCA  C  A  AGA
GUA  GCG GGG GGUGU GC  GUG GCG GG  G
CGU  CGC CCC CCACA CG  CAC CGC CC  A
^ CU-  U  U  C  ---  -  A  CGA
  70          60          50          40

```

JcumiRNA050 in *Vitis vinifera*

dG = -17.70

```

      10          20
A    CAA    UG---|    AA
ACACGAAU  AGUUUG  GUCUCA  U
UGUGCUUA  UCAGAU  UAGGGU  A
A          AA-  CUUAA^  AA
.          50          40          30

```

JcumiRNA051 in *Arabidopsis thaliana*

dG = -36.00

```

      10          20          30          40          50          60
C    C-  UUUC  ACUUAUAUC  -  .-CUCAUCCC  G  .-A|  AA
CUAGUU  UCG  ACCA  UGAAU  GCAU  GGAG CAUC  AAC  \
GGUCAA  AGC  UGGU  ACUUA  CGUA  CUUC GUAG  UUG  G
C          AU  CCU-  CGCCAAAAC  U  \ -----  G  \ -^  AA
.          150          140          130          90

```

JcumiRNA052 in *Vitis vinifera*

dG = -54.10

```

      10          20          30          40          50          60
70
      UUUAU          AAC          AC  ----  A  UG  GAU  .-AAAGGAC|  G  AA  A-
U
ACUCA  CCAAUAUC  UUGAGC  AAUC  CA  CU  AU  GCCC  AA  UUCA  CCCA
CCA  U
UGAGU  GGUUGUGG  AAUUUG  UUGG  GU  GG  UA  UGGG  UU  GAGU  GGGU
GGU  A
      U---          AAA  GA  AUAA  C  GU  AU-  \ -----^  G  C-  CG
G
      160          150          140          130          90          80

```