



Figure 2. Phylogenetic tree showing the relationship of *Rhizobium* strains isolated from legume cover crops (V1, V2, V3, Clo and Pea) in Lamberton with R. leguminosarum species based on partial 16S rRNA gene sequences (550 bp). Phylogenetic analysis was conducted in MEGA, version 7. The evolutionary history was inferred using the Neighbor-Joining method. The optimal tree with the sum of branch length = 0.26513004 is shown. The percentage of replicate trees in which the associated taxa clustered together in the bootstrap test (1000 replicates) are shown next to the branches. The tree is drawn to scale, with branch lengths in the same units as those of the evolutionary distances used to infer the phylogenetic tree. The evolutionary distances were computed using the Maximum Composite Likelihood method and are in the units of the number of base substitutions per site. The analysis involved 82 nucleotide sequences. Codon positions included were 1st+2nd+3rd+Noncoding. All positions containing gaps and missing data were eliminated.

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– RLU29388 U29388.1 Rhizobium leguminosarum bv. phaseoli 16S ribosomal RNA gene partial sequence
  NR 044774.1 Rhizobium leguminosarum bv. viciae strain USDA 2370
  rRNA.1 Rhizobium leguminosarum bv. trifolii 16S ribosomal RNA
  Clo NIN (1053)
  Clo NIN (306 1)
  Clo NIN (306 4)
  Clo WIN (115 2)
  Clo WIN (309 4)
  KR336600.1 R. leguminosarum strain K221
  V1 NIN (1093)
  V1 NIN (308 1)
  V1 WIN (411 1)
  V2 NIN (108 1)
  V2 WIN (202 2)
  V3 NIN (1023)
  V3 NIN (3142)
  V3 NIN (408 3)
  V3 WIN (201 3)
  V3 WIN (313 2)
  V3 WIN (402 4)
  V3 WIN (402 2)
  V3 WIN (313 1)
  V3 WIN (103 3)
  V3 NIN (408 2)
  V3 NIN (314 1)
  V3 NIN (102 2)
  V2 WIN (202 1)
  V1 WIN (411 4)
  V1 WIN (212 4)
  V1 NIN (203 4)
  Pea WIN (412 4)
  Clo WIN (415 4)
  Clo WIN (215 2)
  Clo NIN (405 4)
  Clo NIN (306 3)
  Clo NIN (209 1)
  - V1 NIN (308 4)
  Clo NIN (105 2)
  V3 WIN (313 4)
  V3 WIN (201 4)
  V3 WIN (103 1)
  V3 NIN (408 1)
  V3 NIN (102 4)
  V2 WIN (416 1)
  V2 WIN (114 4)
  V1 WIN (411 2)
  V1 WIN (106 3)
  V1 NIN (203 3)
  Pea WIN (412 1)
  Clo WIN (415 2)
  Clo WIN (215 1)
  Clo NIN (405 3)
  Clo NIN (306 2)
  Clo NIN (105 4)
  AB931136.1 R. leguminosarum strain HV11
      - V1 NIN (203 2)
   V1 NIN (403 4)
    Clo WIN (415 3)
  Clo WIN (215 4)
        - V3 NIN (408 4)
          Clo WIN (215 3)
                         - Pea WIN (412 2)
  KR336596.1 R. leguminosarum strain K248
   V1 WIN (212 3)
   HQ441188.1 R. leguminosarum strain BKBGT18
   Clo WIN (309 3)
   - V2 NIN (302 4)
  Clo NIN (209 4)
  V3 WIN (3133)
  <sup>7</sup>V3 WIN (103 2c)
    - V3 WIN (201 2)
    - Clo WIN (115 3)
   <sub>L</sub>V3 WIN (103 2)
53 V1 WIN (212 1)
└ V1 WIN (212 2)
L V3 WIN (103 1c)
     – V2 WIN (114 1)
  V3 NIN (102 1)
      - V3 WIN (402 3)
   - V3 WIN (402 1)
                     - RHB1RR16SB Bradyrhizobium japonicum USDA 136
                         - NR 036953.1 Bradyrhizobium elkanii strain USDA 76
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