The Comparison of Plant Species under Two Overpasses in Suzhou

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Abstract

As we know, vertical greening takes an irreplaceable role in improving the environment around the skyways. From Wang Jieqing and others paper in 2006[1], we know that the plant species used for the skyway vertical greening were very monotonous. So we doubt that if the goverment improved the greening project in the last forteen years. Do the plants species under each skyways still the same? We chose Renminqiao and s227 to collect the samples.

Introduction

Boston ivy, verginia creeper and other clibing plants are usually use for vertical green under the skyways. The traditional morphology methods work on separating large groups of plants, but it is really difficult to say the differences between these plants from the apperance without special knowledge and experience, so an easy and efficient method that does not require too much professional skill is needed.

DNA barcoding is a new technique developed for identifying different organisms efficiently with a standardized, sufficiently varied, easily amplified and relatively short DNA sequence that exists in all, for example, plant chloroplast DNA. DNA barcoding is a simple test for nonspecialists to do than the traditional morphology approach, which requires expertise and years of experience. Another advantage of DNA barcoding is that it only needs a tiny mass of tissue from the original organism to gain reliable results, which means this will not cause a big harm to the organism. Traditional morphology requires at least a whole organism to get the best results. Besides that, DNA barcoding safely avoids the problems of genetic and phenotype variation among the same species and evolution convergence between different species. For these reasons, DNA barcoding is the best suitable method for us to use in this project.

In this paper, Our group focus on using DNA Barcoding to identify and classify the samples we collected using other plants with known DNA sequence from the databank.

Materials & Methods

The plant samples were found at Renminqiao and east part of s227 , and some leaves were collected, photographed and documented. The samples were labeled and numbered CZT-001, CZT-002, CZT003 to CZT-090 and so on. We used the silica DNA extraction method to isolate DNA from allthe samples. For the primer we selected ribulose-1,5-bisphosphatecarboxylase/oxygenase large subunit genes (rbcL) suitable for allgreen leafy plants. After that we employed polymerase chain reaction(PCR) to amplify the desired length of DNA sequence, and gelelectrophoresis has been done to determine which of the DNA samples could be sent for sequencing. A QIAGEN DNeasy PlantMini Kit (50) has been used on all failed samples.

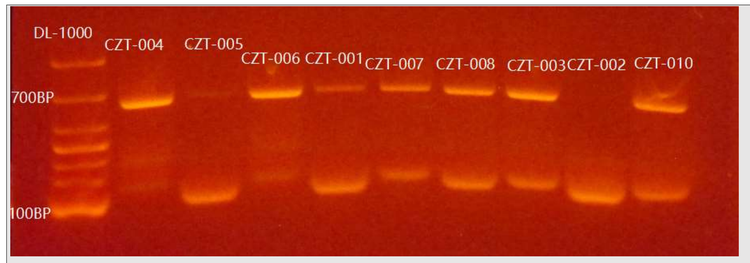

Fig.1 The first gel we ran

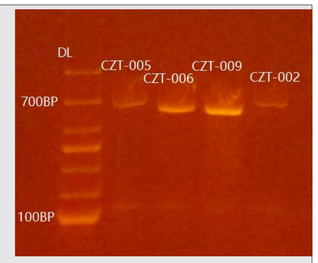

Fig.2 the second gel we ran

Fig.3 Photos of our samples

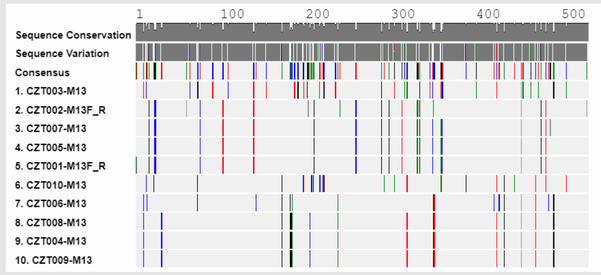

Fig.4 the comparison of DNA sequences of all the samples

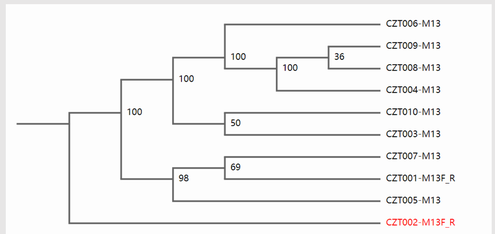

Fig.5 NJ diagram for all of the samples

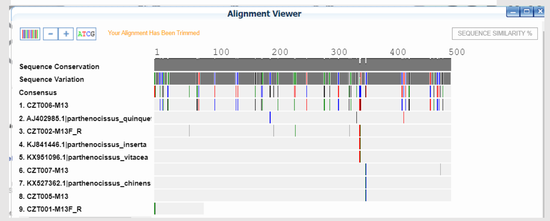

Fig.6 the comparison of DNA sequences for the samples and BLASTN samples

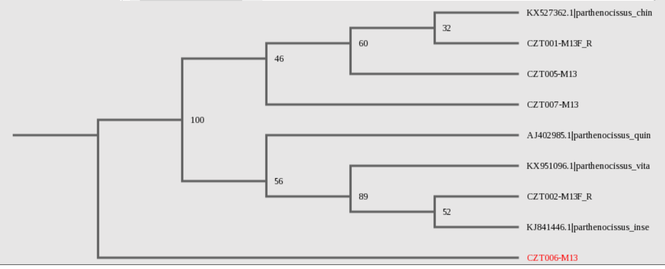

Fig.7 NJ diagram for the samples and sequences which had been classified

Result

The first time we ran the gel(Fig.1), we got great result from CZT-004, CZT-006, CZT-007, CZT-008, CZT-003 and CZT-010. We accidentally lost our DNA from CZT-007. For CZT-005,CZT-002 and CZT-001, we got lots of primer dimer but very few PCR products. We repeated PCR and gel running for the failing samples. In the second time(Fig.2) ,we got all the products, but CZT-005&CZT-002 are still faint.

After analyzing the sequences of Barcoding, we got the NJ tree. For the diagram, we put all the *Pathenocissus* plants in the tree. CZT-006 is exactly another kind of plant so we use this sample as an outgroup. We can find that the CZT-001, CZT-005 and CZT-007 can be separate into one group and CZT-002 can be separate in to another group. CZT-004, CZT-008 and CZT-009 is actually the same species which is *Fataisa Japonica*. CZT-003 and CZT-006 are the plants which really far from the rest.

Discussion

To research on our topic, we use DNA barcoding to identify our samples; as a result, we can build NJ trees to figure out the relationship between those plants under the overpass. Through this process, we find many interesting things. After comparing our samples to those BLASTN results from those field researchers. We try our best to find out what those samples could be. To our surprise, actually, the two special "creeper" are not the same species. While collecting the samples, we found exactly the evironment of *Parthenocissus inserta* has more species than the environment of *Parthenocissus quinquefolia*. And it seems like more wild plants can live in the environment under the environment of *Parthenocissus inserta* .

During our reserch, we get four samples from the Donghuan Overpass which have exactly *Parthenocissus quinquefolia* as its vertical greening. After comparing the sequences by the two trees (NJ and ML), we found that two of the samples (CZT-008 and CZT-009) are the same species which is Fatsia japonica. However, we got 5 different samples from the environment of *Parthenocissus inserta* - the Overpass S227. Sample CZT-007 we get under the Overpass only live in a specific small area. Compared to the BLATN sequence, we found the sample is Parthenocissus himalayana. And the CZT-005 (Parthenocissus semicordata) also give us many questions in that it has a similar DNA to the climber-CZT001(Parthenocissus inserta). As a sequence, we find there are three different ivy species under the S227 Overpass. One of them climbs on the wall (CZT-001) and two of them paly a role as “creeper” on the ground (CZT-005 and CZT-007).
We tried to compare the plant species we got to those planted by government 14 years ago, but the government work reports did not provide the scientific name of those plants.

While collecting the sample, we found some unexpected phenominum. There are automatic irrigation systems under the Donghuan Overpass. Surprisingly, those *Fatasia japonica* near the system can hardly survive while the same kind of plant lives in a great condition which far away from the watering equipment. We believe that the system might has provided over amount water to the vegetation. This could be a possible answer to why the condition of plants under S227 Overpass are better and the plants diversity is higher than Donghuan.

References

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[2] Afforestation and Research Present Situation of Domestic Viaduct，Heilongjiang Agricultural Sciences ，ID：100222767(2009)0220168203

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