EXPRESSION OF INTEREST FOR TECHNOLOGIES DEVELOPED

Content

ABOUT GUJARAT BIOTECHNOLOGY RESEARCH CENTRE

Gujarat Biotechnology Research Centre is established as an autonomous society under Department of Science and Technology, Government of Gujarat for tackling societal problems of state priority through cutting-edge Biotechnological intervention. The organization is well equipped with advanced research infrastructural facilities related to genomics, bioinformatics, Biobanking, and bioprospecting. The focus of GBRC is not only to undertake conduct cutting-edge research in the frontier areas of biotechnology but also conducting translational research leading to the development product/ prototype/ process development with application in healthcare, agriculture, environment, marine etc. GBRC is also evolving as a state-of-art shared laboratory facility by extending its infrastructure to outside organization/Institutions/Industries/Students for their research purposes.

ABOUT TECHNOLOGY

GBRC has developed few in-house technologies which have been approved for licensing. These technologies are expected to be better and cost effective compared to those available in market. Following technologies available for licensing:

1. Amplicon panel for diagnosis of Muscular Dystrophies (MDs)
2. Amplicon panel for diagnosis of Hereditary Breast and Ovarian Cancer (HBOC)
3. Overproduction and purification of recombinant Serratiopeptidase
4. Overproduction and purification of active recombinant tissue Plasminogen Activator (tPA)
5. Dengue serotype diagnostic kit
6. Method for detection of Omicron variant of SARS-CoV-2
7. Developing probiotic formulation to treat endometritis in bovines
8. Molecular methods for identification and discrimination of *Ocimum tenuiflorum syn sanctum* and *Ocimum basilicum*
9. Molecular methods for identification and discrimination of *Piper sp.* and *Carica papaya*
10. Molecular methods for identification and discrimination of *Bacopa monnieri* L. and *Centella asiatica* L.
11. Kit for sex determination in date palm

Detailed explanation about the technologies are in the following pages.

1. Amplicon panel for diagnosis of Muscular Dystrophies (MDs)

Background

Muscular dystrophy is a genetically heterogeneous group of neuromuscular diseases that result in degradation of skeletal muscles, progressive muscle weakness, loss of ambulation, cardiac attack, and respiratory failure. More than 30 different types of MDs are known.

Duchenne Muscular Dystrophy (DMD) (OMIM#310200) is the most common, rapidly progressive, and severe neuromuscular disease. About 40 different genes have been reported for the occurrence and/or progression of MDs. Multiplex Ligation Dependent Probe Amplification (MLPA) or array-CGH (aCGH) diagnostics tests are being used to detect large CNVs (Deletions/Duplications) in MDs. The results of these diagnostic tests further require targeted sequencing to detect SNVs in the DMD/BMD cases and performing aCGH in all referred cases would be time consuming and expensive.

Technology

Amplicon panel-based diagnosis was carried out for 102 (DMD/BMD) cases and the results were further screened using multiplex ligation-dependent probe amplification (MLPA). Whilst in the case of LGMD (N=19) and UMD (N=2), only NGS panel-based analysis was carried out. We identified the large deletions in 74.50% (76/102) of the cases screened with query DMD or BMD. Further, the large deletion in CAPN3 gene (N=3) and known SNV mutations (N=4) were identified in LGMD patients. Together, the total diagnosis rate for this amplicon panel was 70.73% (87/123) which demonstrated the utility of panel-based diagnosis for high throughput, affordable, and time-saving diagnostic strategy.

Silent Future: This is comprehensive panel of 28 genes which can detect 2 different type of muscular dystrophy for CNV and SNP detection

Potential Applications

The analysis of CNV in the DMD gene concludes that our custom gene panel is superior to the MLPA method. NGS-based diagnosis is not only time-saving but also cost-effective method when compared with traditional testing strategies.

Technology Status

Technology is to use ready and tested in proband and carrier.

2. Amplicon panel for diagnosis of Hereditary Breast and Ovarian Cancer (HBOC)

Diagnosis of Hereditary breast and ovarian cancer (HBOC) by customized multi-gene panel

Background

Breast and ovarian cancer are the most prevalent cancer and leading cause of death in Indian women. The incidence of breast cancer cases in India in 2018 was estimated to be 162,468, which is 27.6% of all cancer cases in females. Whereas, for ovarian cancers, it was estimated to be 36,170, which is 6.2% of all cancer cases in females. Gujarat ranks first in deaths due to breast cancer and seventh in deaths due to ovarian cancer among other states of India. Moreover, the ratio of number of deaths to new cases in case of breast cancer is increased to 56.30% (87090/ 162648) in India which is much higher as compared to F.6% (131,347/458,718) in Europe and 19% (48,850/256,222) in the US. Hereditary breast and ovarian cancer (HBOC) is an inherited disorder in which the risk of breast and ovarian cancers is higher than normal BOC. About 5–10% of breast cancers and 10–15% of ovarian cancers can be attributed to HBOC. HBOC is characterized by bilateral cancer with a family history of breast or ovarian cancer in relatives. BRCA1 and BRCA2 (BRCA1/2) genes are maximally associated with predisposition to HBOC; however, in addition to the BRCA1/2 genes, the National Comprehensive Cancer Network (NCCN) guidelines have been expanded to incorporate non-BRCA genes into gene panels for increased medical management

Technology

We developed a customized multi-gene panel for the genetic screening of hereditary breast and ovarian cancer. we used 14 genes panel, in accordance with 2014 NCCN guidelines and other literature, for determining the contribution of BRCA and non-BRCA genes in HBOC in the Indian population. We were able to detect 42 pathogenic mutations in [40/144] cases. Majority of pathogenic mutations (30/41) were detected in BRCA1 gene, while (7/41) pathogenic mutations were detected in BRCA2 gene, whereas, (2/41) pathogenic mutations were detected in TP53 gene and BRIP1, PALB2, and ATM genes respectively. So, BRCA genes contributed 88.09% of pathogenic mutations, whereas non-BRCA genes contributed 11.91% of pathogenic mutations.

Potential Applications

Early detection of cancers can be done by genetic screening using customized multi-gene panels. In Indian population, apart from the common BRCA genes, there are other genes that are also responsible for the HBOC. High frequency mutations detected in this study and variants of uncertain significance predicted to be damaging by in silico pathogenicity prediction tools can be potential biomarkers of hereditary breast and ovarian cancer in Indian HBOC patients.

Technology Status

Technology is ready to use and tested in multiple human clinical samples.

Silent Future: This is comprehensive panel of 14 genes which can detect Hereditary Breast and Ovarian Cancer (HBOC).

3. Overproduction and purification of recombinant Serratiopeptidase

Production of Serratiopeptidase by engineered Escherichia coli strain for therapeutic application

Background

Serratiopeptidase is one of the important proteases which belong to the serine protease family. It is an extracellular zinc-containing metalloprotease that is produced by Serratia marcescens having molecular weight of about 53kD. It has shown therapeutic (anti-inflammatory, anti-fibrinolytic and analgesic) as well as industrial applications (detergents, food processing, leather, paper and brewing etc.). The evolution of *Serratia marcescens* as an opportunistic pathogen associated with various infections has led researchers to think and develop an alternate strategy for its industrial production.

Serratiopeptidase is also taken as a supplement to augment the overall health of the cardiovascular system. It has also shown to reduce the cancer metastasis by thinning its extracellular matrix as well as to solubilize non-living tissues such as mucous, plaques and blood clots. It has the potential to cure and treat several disorders such as atherosclerosis, arthritis, bronchitis, carpal tunnel syndrome, fibrocystic breast disease, Crohn's disease, leg ulcers, traumatic swelling, fibromyalgia, breast engorgement, migraine, Alzheimer's disease, sinusitis, hepatitis, lung disorders, arthritis, diabetes, carotid artery blockage, thrombosis, uterine fibroids.

Currently the industrial production of serratiopeptidase makes use of natural S. marcescens strain. However, many challenges and issues have arisen to use this strain because of pathogenic nature, lack of genetic tools, unclear mechanism of the utilization of cheaper carbon and nitrogen sources, industrial -scale fermentation and process. The bacteria is also reported to cause pneumonia, septicemia, and as well is associated with cystic fibrosis. Therefore, a pressing need has arisen to find an alternative approach for the production of active and efficient serratiopeptidase

Technology

GBRC make successful cloning, expression and purification of active serratiopeptidase, using Escherichia coli BL21 [DE3] and pET SUMO vector. Further it also optimize synthetic media and culture conditions for enhanced serratiopeptidase production. Initial optimization of physical parameters was done followed by a screening of different carbon and nitrogen sources. The significant media components for serratiopeptidase production as shown by factorial screening experiment were subjected to Response Surface Methodology (RSM) based optimization.

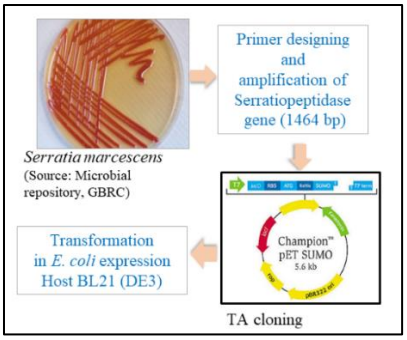
Silent future: In Bioreactor study, final yield of 2.5 ± 0.764 g L-1 of protein was obtained having 8382±291 U mg-1 of specific

Potential Applications and Benefits:

The success of the application of a statistical model for designing an optimized media for enhanced serratiopeptidase production also suggests a new insight for the scale up of serratiopeptidase towards industrial applications.

Technology Status

Technology is ready and the optimized media yielded 2.5 ± 0.764 g L-1 of protein was obtained having 8382±291 U mg-1 of specific caseinolytic activity.



4. Overproduction and purification of active recombinant tissue Plasminogen Activator (tPA)

Scale up production of important biopharmaceuticals e.g. recombinant tissue Plasminogen Activator

Background

Thrombolytic therapy is used extensively and successfully to treat cardiovascular and cerebrovascular diseases, like acute myocardial infarction (AMI) and stroke, which are substantial contributors to illness and death globally. Thrombolytics such as plasminogen activators catalyze the conversion of plasminogen to plasmin, and plasmin's fibrinolytic properties break up intractable fibrin clots. Tissue-type plasminogen activator (tPA) being the first drug approved by Food and Drug Administration (FDA) from this category. Reteplase is a 355 amino acid single-chain non-glycosylated deletion mutant of tPA. It consists of only Kringle II and protease domains. Because of the absence of Kringle I and EGF domains, rPA fails to bind with human hepatocellular specific receptors, and this prolongs the half-life of reteplase in blood. It has a 600-fold higher affinity towards fibrin than tPA. Recombinant tPA is being marketed with the brand names such as Alteplase, Reteplase and Tenecteplase out of which Alteplase has similar structure as human tPA. Tenecteplase has modification at three sites in comparison to human tPA and Reteplase is truncated and non – glycosylated version of tPA. Most of the commercially available rPA is non-glycosylated, purified from inactive inclusion bodies; over expressed in *Escherichia coli*.

Technology

GBRC has achieved successful cloning, expression, and purification of active recombinant tissue Plasminogen Activator, Reteplase (rPA) utilizing E. coli Rosetta gami2 strain from Novagen®. Further culture conditions under flask and bioreactor level were optimized for enhanced rPA production. Initial optimization of extraction and purification of active rPA from Inclusion Bodies done by various physical and chemical parameters. Refolding of proteins followed by activity assays for clot lysis and Fibrinolytic activity of rPA analyzed by in vitro assays.

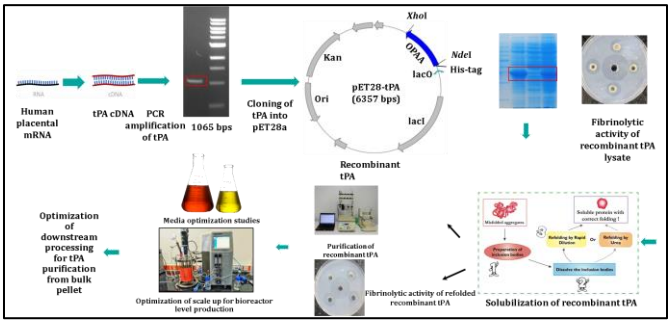
Silent future: In Bioreactor study, final yield c 85.2 gm/lit of active protein was obtained.

Potential Applications and Benefits

The success of the application of a statistical model for designing an optimized media for enhanced rPA production also suggests a new insight for the scale up of rPA towards industrial applications.

Technology Status

Technology is ready and the optimized media yielded of 85.2 g L-1 of protein was obtained.



5. Dengue serotype diagnostic kit

A cost effective PCR based diagnostic kit for detection of Dengue serotypes caused by *A. aegypti* with high sensitivity and specificity

Background

Dengue virus (DENV) is a small single-stranded RNA virus comprising mainly four distinct serotypes (DEN-1 to -4), that belong to the genus Flavivirus and are transmitted by Aedes sp. Mosquitoes. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic After an incubation period of 4-10 days, infection by any of the four virus serotypes can produce a wide spectrum of clinical manifestations spanning asymptomatic infection, dengue fever and severe dengue, a category that includes entities previously classified as dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Given the geographic expansion of DENV1-4, rapid and accurate serotyping of dengue is crucial for dengue diagnosis and epidemiologic surveillance, treatment of patients, control of dengue outbreaks and transmission-blocking strategies targeting the vector, as well as for development of vaccines and antivirals. Thus, this single tube multiplex Real Time RT-PCR assay can be used as a method for differential diagnosis of a specific DENV serotype in viremia dengue patients during the early phase of the infection. The technology is designed for the diagnosis and technology is designed for the diagnosis and serotyping of the Dengue virus in clinical samples with higher sensitivity and specificity.

Technology

Gujarat Biotechnology Research Centre has developed one step multiplex Real-time PCR based diagnostic kit for dengue serotyping using all four serotypes (DENV1-4) specific primers & probes. The developed assay has high sensitivity and specificity. The diagnostic kit is expected to be cost effective compared to presently available real-time RT-PCR based assays.

Potential Applications

Diagnosis and discrimination of dengue serotypes transmitted by A. aegypti.

Value Proposition

- Highly specific and sensitive
- Quick and one step assay (Viral RNA as a sample)
- Ability to differentiate all four dengue serotypes
- Cost effective compared to existing Real-time PCR based assays

Technology Status

Kit has been tested in human clinical samples

Silent future: Multiplex qRT-PCR based diagnostic kit for detection of Dengue

6. Method for detection of Omicron variant of SARS-CoV-2

Background

Omicron, B.1.1.529, (BA.1; according the new classification), the new emerging variant of concern (VOC) of SARS-CoV-2 has re-alerted the world again to the COVID-19 pandemic situation. Since the first case in Wuhan, China, scientists have discovered over 1900 SARS-CoV- 2 lineages. Many of these lineages, however, have overpowered pandemic situations, such as the second wave in India caused by the Delta variant (B.1.167.2) of SARS-CoV-2. This hyper mutated variant contains 15 mutations in RBD (receptor binding domain), leading to reduced binding of neutralizing antibodies but not complete escape from the system. A second wave of the SARS-CoV-2 pandemic was sparked by the emergence of a delta variant with substantial mutations in the NTD (N-terminal domain), resulting in a prominent case of immunological escape. Omicron with concerning mutations in NTD, along with RBD might be more infectious and may lead to increased transmission as well as re-infection of SARS-CoV-2. For better management of the pandemic situation, quick and reliable method to track the major Omicron variants from the positive COVID-19 cases is very essential.

Technology

We have developed a set of primers targeting the key mutations including insertions and deletions in spike protein encoding gene of this variant, allowing us to distinguish Omicron form the other SARS-CoV-2 lineages and simultaneously BA.2 and BA.1 differentiating.

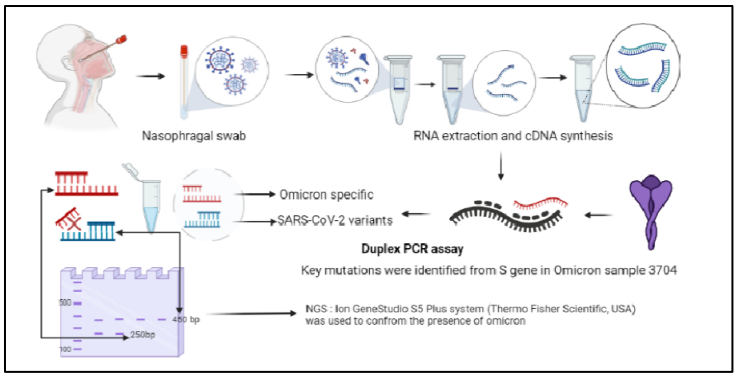
Potential Applications

The rapid and cost-effective PCR based test can help in early identification of Omicron cases from community and therefore in better management in fight against COVID-19.

Technology Status

Technology is ready and to use and validated in clinical samples along with concordance in genome sequencing.

Silent future: PCR based method for detection of BA. 1 and BA. 2 Omicron variant simultaneously



7. Developing probiotic formulation to treat endometritis in bovines

Cure Bovine Endometritis with Site Specific Probiotics

Background

Uterine diseases cause infertility and repeat breeding conditions in bovines (cattle and buffaloes in Indian scenario) leading to decreased reproductive efficiency followed by effect on production and increased odds of early culling of animals from herd. This phenomenon ultimately ends up with astonishing economic losses to the dairy industries. During transition period it is common that cattle and buffalo have nutritional requirements that exceed their dietary intake potential. This leads to a state of negative energy balance during which, body tissue reserves mobilize to provide energy. The Calving process, on the other hand, allows environmental and opportunistic microorganisms to move, transit, remain, and invade the reproductive system. The traditional broad spectrum antibiotic therapy has limited success considering non-specific polymicrobial infection during the postpartum period and also develops antimicrobial resistance. This phenomenon made researcher to think on alternative approaches. Of late, in human use of LAB gave promising results. However, in bovines no such data is available on the role of LAB in vaginal microbiota as well its effect on animal health. Here in this work we have isolated various probiotics cultures from healthy uterus of buffalo and cow and screened them for their potential probiotic activities. From these isolates after detailed In-vivo and In-vitro testing, potential consortia had been formulated and tested in the field trial.

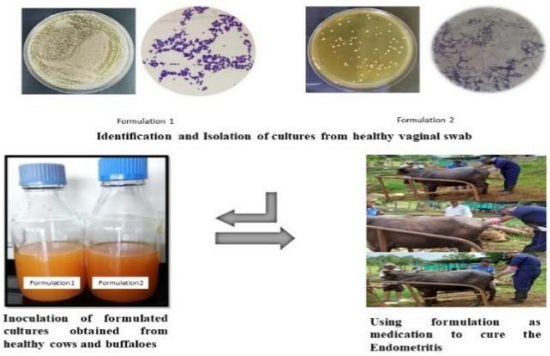
Technology

We have developed a probiotic formulation, which were originally isolated from vaginal microflora of healthy buffalo and cow. Their probiotics characteristics were studied phenotypically and genotypically. Applications of these probiotic consortia was done on animals with endometritis.

Estrous induction was found in formulation one and two at rates of 44% and 51% respectively and both the formulations showed a pregnancy rate of 60% and 68% respectively.

Potential Applications

New approach to treat endometritis in dairy animals. Probiotic bacteria produce antimicrobial peptides and organic acids that has potential to inhibit pathogens. New probiotic formulation has as probiotics can be use to prevent and/or treat bovine endometritis. There is growing concern about the potential impact of extensive antibiotics used in livestock, which is resulting in the spread of AMR (Anti-Microbial Resistant) strains. Infections caused by multi-drug resistant strains can be combated by the use of probiotic formulation.



8. Molecular methods for identification and discrimination of *Ocimum tenuiflorum* syn *sanctum* and *Ocimum basilicum*

Background

O. basilicum L. (sweet basil) and *O. tenuiflorum* L. syn *O. sanctum* (holy basil) are the two economically and medically significant species. *O. basilicum* L. is mainly used as a fragrance enhancer in the food and perfume industries due to its aromatic secondary metabolites. Moreover, *O. basilicum* L. has prominently displayed antibacterial, anticonvulsant, anti-inflammatory, antioxidant, antidiabetic, antistress, antihyperlipidemic, anticancer, hepatoprotective and immunomodulatory properties. Hence, it is usually used in Unani and Siddha medicinal systems. On the other hand, Tulsi (*O. tenuiflorum* L.) is one of the most sacred plants in Ayurvedic and Indian tradition. It is referred to as an 'Elixir of Life' and the 'Queen of herbs' and is widely used for therapeutic as well as cosmetic purposes. Both the species have higher trade value globally. Trade volume of *O. basilicum* seeds is 100-200 MT/year and *O. tenuiflorum* is one the most cultivated medicinal plants with market demands of 2000–3000 MT/year (http://www.rcfceast.org/wp-content/uploads/2019/03/chapter11.pdf; Last accessed on 04/06/2024). However, as both plants have similar morphology, sometimes it is difficult to discriminate them. The primary requirement for any valuable herbal product is an authentic plant species used in its formulation. Therefore, we have developed a simple and cost-effective PCR method for the identification of *Ocimum basilicum* and *Ocimum tenuiflorum*.

Technology

We have designed primers specific to *O. tenuiflorum* and *O. basilicum*. A multiplex PCR has been developed and optimized for unequivocal identification of these species in herbal raw material as well as in dried powder. The primers and PCR assay has been validated using standard mixtures of both the species along with *Vitex negundo*. Results revealed specificity and selectivity of the primers for both the species. The minimum detection limit of detection of *O. tenuiflorum* is 25% when present in mixture with *O. basilicum.*

Potential Applications

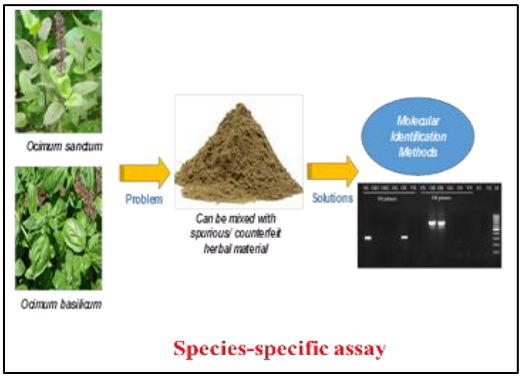
The rapid and cost-effective PCR-based approach developed in this study could be used to detect *O. tenuiflorum* and *O. basilicum* in herbal formulations and their discrimination.

Technology Status

Technology is ready to use and have been validated with standard and market herbal formulations **(Indian patent application No.: 202021056915).**

Silent future:

1. PCR based single tube assay for the detection of *O. tenuiflorum* and *O. basilicum* in herbal powder formulations.



9. Molecular methods for identification and discrimination of *Piper sp.* and *Carica papaya*

Background

The spice made from the fruits of *Piper nigrum* has economic and medicinal importance. It is a phenomenal species with an immense and immemorial presence in food and cuisine around the world, with the entitlement of "The King of Spice". Other than as a spice, it can be used as an antioxidant, anti-inflammatory, antibacterial, antifungal, and antitumor agent. Estimated annual demand of *P. nigrum* as herbal raw drug in Indian market is 1000-2000 MT (http://www.rcfceast.org/wpcontent/uploads/2019/03/chapter11.pdf; Last accessed on 04/06/2024). Due to the high demand, as well as export and trade, the quality is threatened by the mixture of cheap and morphologically similar materials, mainly *Carica papaya* seeds. Therefore, we have developed a simple and cost-effective PCR method for the identification of *Piper nigrum* and mixing of *Carica papaya* with *Piper nigrum*.

Technology

We have designed primers specific to *Piper spp*. and *Carica papaya*. A multiplex PCR has been developed and optimized for unequivocal identification of these species in raw material as well as in dried powder. The primers and PCR assay has been validated using standard mixtures of both the species. Results revealed specificity and selectivity of the primers for both the species. The minimum detection limit of *Carica papaya* seed is 1% when present in mixture with *P. nigrum* in the tested compositions.

Potential Applications

The rapid and cost-effective PCR-based test developed in this study could be used to detect *Piper spp.* and mixing of *Carica papaya* (if any) in the final market products of *Piper*.

Technology Status

Technology is ready to use and have been validated with standard and market herbal formulations.

Silent future:

1. PCR based single tube detection method for identification of *Piper spp* and to check the presence of papaya seeds in piper powders.

10. Molecular methods for identification and discrimination of *Bacopa monnieri* L. and *Centella asiatica* L.

Background

Brahmi is herbal therapeutics used in Indian traditional medicinal systems for treating neurological and psychiatric disorders like memory loss, cognitive deficits, and impaired mental function. It is widely sold in the market, with the name "Brahmi'' being used to describe both *Bacopa monnieri* and *Centella asiatica*. These two species are a classic illustration of confusing and misrecognized species because of parallel evolving knowledge systems, currently used polynomial nomenclature in Sanskrit, varying perceptions in various communities, and vernacular equivalent. Due to overlapping therapeutic properties, both Brahmi are described as Medhya Rasayana (brain tonic), however in Charaka Samhita *C. asiatica* is included in medhya rasayna, and over the period, *B. monnieri* is also used for the same. In Indian markets the annual demand of *B. monnieri* is 1000-2000 MT whereas for *C. asiatica* annual demand is 500-1000 MT (http://www.rcfceast.org/wpcontent/uploads/2019/03/chapter11.pdf; Last accessed on 04/06/2024). The Brahmi trade chain holds significant value; hence, a high prevalence of substitution, economically motivated, and unintentional adulteration has been observed to reach demand and supply. A simple and cost effective PCR method has been developed to identify both the species correctly which has been described below.

Technology

We have designed primers specific to *Centella asiatica*. PCR assays have been developed and optimized for unequivocal identification of *Bacopa monnieri* and *Centella asiatica* in herbal raw material as well as in dried powder. The primers and PCR assay has been validated using standard mixtures of both the species. Results revealed specificity and selectivity of the primers for both the species. The minimum detection limit of both the species is 25% when present in mixture in the tested compositions.

Potential Applications

The rapid and cost-effective PCR-based test and approach developed in this study could be used to detect *Bacopa monnieri* and *Centella asiatica* in herbal raw material as well as in dried powder.

Technology Status

Technology is ready to use and have been validated with standard and market herbal formulations.

Silent future:

1. PCR based detection methods for detection of *Bacopa monnieri* and *Centella asiatica* in brahmi based herbal powders.

11. Kit for sex determination in date palm

PCR based methodology for gender identification in date palm (Phoenix dactylifera L.) of Gujarat, India

Background

The Date palm (*Phoenix dactylifera* L.) is one of the chief flowering plants included in the family of Arecaceae. In India, the area for date palm cultivation is around 18286 ha with 171522 MT production. In India, date palm is cultivated among the major parts Kutch region of Gujarat and few regions of Rajasthan. In date palm is dioecious plant in which inflorescence has male and female flowers on different plant. Traditionally, Date palm plants are produced from seed, and because of dioecious nature, seed produced plants contain approximately the same number of males and females plants. Additionally, only female plants produced fruits, and few male plants were needed only for pollination and fertilization with female ovules. Hence, the selection of female plants is the most crucial procedure for the economic cultivation of date palms. The sex of seedlings can be find out only in the flowering stage and it produces mostly at the age of 4-8 years of the plant. So, the initial gender determination of date palm is very important for farmers for increasing profits.

Technology

GBRC has developed DNA based molecular technique to detect sex of the plant at very early age. The technique very robust and based on simple PCR test. PCR based sex determination of date palm with Glycerol-3 phosphate acetyl transferase (GPAT3) male specific primer and LOX5.1 as positive control. GPAT3 plays important role in male fertility. According to results GPAT3 amplification only occur in male date palm samples, not in female. So that, if result of PCR amplification produced two bands than male and if one band than it is female.

Potential Applications and Benefits:

- The sex determination of seedlings at early stage could help to improve breeding efforts by generating experimental gender specific genetic pools that will promote date palm genetic improvement.
- It also helps to farmers for removing unwanted extra male plants at seedling stage and by which it can increase production of date palm.

Silent Future: PCR based method which can detect sex of date palm.

Technology Status

Technology is ready and already tested for more than 300 date palm leaf samples collected from different areas of Gujarat, India and it can successfully distinguish male and female sex of date palm.

MODALITIES OF TECHNOLOGY TRANSFER

Modalities of technology transfer will be discuss on case to case basis.

WHO CAN APPLY?

Essential Requirements

- ✓ The organization must be a reputed Firm/Company/SME/Start-up/R&D company, incorporated in India with A standing of at least 2 years.
- ✓ The turnover is to be supported by financial statements of accounts/ Annual reports duly certified by a Chartered accountant/ Balance sheets of last 3 years / Income tax returns for the last 3 years period / Company PAN number.
- ✓ Company profile, giving details of current activities and management personnel structure including evidence of incorporation.
- ✓ Details of absorption of technology for a product/ know-how that has been taken up on production scale in the past may also be given.
- ✓ Successful bidder will have manufacturing license for life time but will have 2 years of exclusivity. After this period GBRC will carry out the auction process again and give the license to other parties as well.

GENERAL TERMS AND CONDITIONS

i. An expert committee will scrutinize the applications for follow-up action.

ii. The applicants may be called for a presentation regarding their strengths and business proposals

iii. Applicants will have to sign NDA with GBRC before entering into detailed discussion about technologies.

iv. All incidental expenditure incurred in preparation/ submission or presentation of the EoI shall be borne by the participating agency.

v. Participation in this EoI does not guarantee any association with GBRC unless notified by GBRC in writing.

vi. GBRC reserves the right of rejecting any EoI without assigning reasons.

vii. Last date for submission of EoI is given in the advertisement. Any offer received after due date and time will not be accepted.

viii. A Committee of experts constituted by GBRC will assess capabilities and strengths of the industry before finalizing the technology partners.

ix. The industry willing to take technology for commercial exploitation will be required to enter into a ToT agreement with GBRC as per the terms and conditions approved by the Executive Committee of GBRC in the prescribed format.

x. When the design of the new technology is patented, the patent rights shall rest with

GBRC.

xi. All disputes in context to the same are subject to Gandhinagar Jurisdiction Only.

HOW TO APPLY?

Interested applicants may send Expression of Interest (EoI) with their details by filling the questionnaire as per **Annexure** along with supporting documents in the completely sealed envelope on the address given below **on or before 04/07/2024:**

Director GBRC
Gujarat Biotechnology Research Centre
(Department of Science and Technology, GoG)
M.S. Building, 6TH Floor,Sector - 11,
Gandhinagar-382011, Gujarat.

CONTACT PERSON FOR ENQUIRIES

Dr. Madhvi Joshi, Scientist D and Joint Director, GBRC
Email: jd1-gbrc@gujarat.gov.in
Phone: 9978441233

Annexure (Template for the EOI for Transfer of Technology)

Sr. No.	Particulars
1.	EOI Notice (Advertisement No.):
2.	Name of technology/technologies for which EoI is applied with reasons of choosingthe technology:
3.	Details of the Contact Person:
	(i) Name:
	(ii) Address:
	(iii) Telephone:
	(iv) Fax:
	(v) E-mail:
	(vi) Website:
4.	Year of establishment:

5.	(i) Type of Organization: Public Sector/ Limited/Private Limited/ Partnership/ Proprietary/ Society/ Anyother.
	(ii) Whether 'Foreign Equity Participation (Please give name of foreign equity participant and percentage thereof).
	(iii) Names of Directors of the Board/ Proprietors.
	(iv) Name and address of NRI(s), if any
6.	Category of the firm: Large/Medium/Small scale unit
7.	Nature of Business: Company/ Start-up/ SME etc.
8.	Address of the registered office: