ANALYSIS OF MUSHROOMAGROLOGY

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ABSTRACT
A compressive description of tropical milky white mushroom (Calocybe indica P&C var. APK2) is provided in this review. This mushroom variety was first identified in the eastern Indian state of West Bengal and can be cultivated on a wide variety of substrates, at a high temperature range (30~38°C). However, no commercial cultivation was made until 1998. Krishnamoorthy 1997 rediscovered the fungus from Tamil Nadu, India and standardized the commercial production techniques for the first time in the world. This edible mushroom has a long shelf life (5~7 days) compared to other commercially available counterparts. A comprehensive and critical review on physiological and nutritional requirements viz., pH, temperature, carbon to nitrogen ratio, best carbon source, best nitrogen source, growth period, growth promoters for mycelia biomass production; substrate preparation; spawn inoculation; different supplementation and casing requirements to increase the yield of mushrooms has been outlined. Innovative and inexpensive methods developed to commercially cultivate milky white mushrooms on different lignocellulosic biomass is also described in this review. The composition profiles of milky white mushroom, its mineral contents and non-enzymatic antioxidants are provided in comparison with button mushroom (Agaricus bisporus) and oyster mushroom (Pleurotus ostreatus). Antioxidant assay results using methanol extract of milky white mushroom has been provided along with the information about the compounds that are responsible for flavor profile both in fresh and dry mushrooms. Milky white mushroom extracts are known to have anti-hyperglycemic effect and anti-lipid peroxidation effect. The advantage of growing at elevated temperature creates newer avenues to explore milky white mushroom cultivation economically around the world, especially, in humid tropical and sub-tropical zones.

1. INTRODUCTION

Mushroomsarethefleshy,spore-bearingfruitingbodyofafungus,typically producedabovegroundonsoiloronitsfoodsource.They containnumerousspores, functionallysimilartoseedsofthehigherplantsforpropagationoffungi.Theeconomic importanceofmushroomliesprimarilyintheiruseasfoodforhumanconsumption.The exoticflavour,tasteandfleshinessofmushroomhavemadeitanimportantdelicacyin humandiet.Mushroomisconsideredtobeacomplete,healthyfoodandsuitableforall age groups.Though, the nutritionalvalueis determinedbythetype,stage ofdevelopment andotherenvironmentalconditions,mushroomsarerichinproteins,dietaryfiber, vitaminsandminerals.Theyhaveinsignificantlipidlevelandhighproportionof polyunsaturatedfattyacidsresultinginlowcalorificvalue.Mushroomsareanexcellent sourceofvitaminsespeciallyCandB.Mushroomsarealsoknowntohavemedicinal valuesasthesehavebeenshowntopromoteimmunefunction,boosthealth,lowerriskof cancerinhibitingtumourgrowthandsupportbody'sdetoxificationmechanism.Most mushroomfarmersgrowtheirmushroomsindoors– humidity,temperatureandCO2in allareasofthefarmmustbepreciselycontrolledtoproduceoptimalgrowth.Manually monitoringtheenvironmentcanbeverytimeconsumingandmostheating,A/Cand humiditycontrolsystemshaveveryimpreciseautomatedcontrol.Gettingmaximum productivityoutofamushroomfarmrequiresday-by-daychangestooptimalhumidity, temperaturesandCO2dependingonthegrowthstage– thisrequiresanautomated solution(oracost-ineffectiveamountofmanuallabour).Inmushroommonitoring solution,humidity,temperatureandCO2istrackedinrealtimeviasensorsplacedinto themushroomgrowingsystematkeyintervals.Factors ofgrowtharecontrolledbasedon datafromsensors tofollowanoptimal"growthcurve"forthe mushrooms attheirdistinct stages ofdevelopment.

1.1ExistingSystem

Inpreviousworkenvironmentalparametersaremonitoredandcontrolled

manually.Theownerisfarawayfromthefarmcouldn't reachintimethenproblem occurredinthesemethods

1.2ProblemsofExistedSystem

- Manualmonitoringisnotcontinuous.
- Elevatedriskof lossinproductivitybecause ofhumanerror.
- Manpowerinvolvedinthecultivationmonitorin gprocess.

1.3ProposedObjectives

Toreduce themanpowerthefarmenvironmentadjustsitselfauto maticallyaccording totheneedofspecifictypeofmushroom.Itisanintelligen tsystemthatautomatically adjuststhevitalthingsliketemperature,moistureandca rbondioxidelevelofthe cultivationroom.Whenitistimetospraywaterortoprovi defreshairandremove carbon-dioxidefromthecultivation room,thesystemwillnotifyaftertakingeachaction. Farmersdon't needmanualintervention.Thesystemca nmaintainproperbalanceofsoil moisture,temperature,andcarbon-dioxidethatisessentialforagoodyieldof mushrooms.WiththehelpofthissystemFarmerscanea silymonitorthroughmobile phone.Aseverythingtodayisdigitalizedhence,thispro posedsystemisalsodigitalwith IoT technology.

1.4ProposedSystem

Theobjectiveofproposedsystemisdesignedformonito ringandcontrollingthe ecologicalparameters offarmbysittingina room.

1.5AdvantagesofProposedSystem

1.Qualityof mushrooms willbeimproved.
2.Manpowermeanshumanefforts getreduced.
3.Ownerofthefarmcanmonitorinternalstructure ofthefarmbysittingina room.4.Itprovides Quickerandaccurateinformationaboutdifferentp arameters tofarmers.

2. ANALYSIS

Theanalysisphaseiswheretheprojectlifecyclebegins. Theactualworktobedonewillbe started.Gatheringrequirementsistheinitialstepofthisa nalysisphase.Theprocessof gatheringrequirementsissimplyaskingusersofcustom er'squestionsandnotingdownthe answers.Inthisphasethedevelopergetsclarityaboutti metakentodevelopproject,total revenue tobe spendandallthe requiredparameters

2.1RequirementsAnalysis

Requirementsanalysisiscriticaltothesuccess or failureof asystemorsoftwareproject.The requirementsshouldbedocumentedactionable,measu rable,testable,traceable,relatedto identifiedbusinessneedsor opportunities,anddefinetoalevelof detailsufficientforsystem design.

Inordertodevelopthe specific systemthatwilloperateinthe targetenvironmentandmeet the specific objectives requirementanalysis was conducted.

Inour projectliquidcrystaldisplay(LCD)whichis usedtoproduceavisibleimage, mq2sensorwhichis usedforsensingthe concentrationofthe gases anddht11sensorwhich is usedforcheckingthe humidity.

2.1.1FunctionalRequirementsAnalysis:

Insoftwareengineeringandsystemengineeri ng,afunctionalrequirementdefinesa functionofasystemoracomponent.Afunctionisdefine dasasetofinputs,thebehavior andoutputs.

- Themq2sensorshouldsenseaccurat elyifthecarbondioxideismoreintheroom thenitshoulddisplayintheLCDscreenandthe fansshouldwhichsendsthecarbon dioxide outofthe room.
- The dht11shouldcheckthe humidityinthebags wheremushrooms aregrown.

2.1.2UserRequirements

- Theuserrequirementsdocumentor userrequirementspecificationisadocument usuallyusedinsoftwareengineeringthatspe cifieswhattheuserexpectsthe softwaretobe able todo.
- Authorizedpersonwillbe able toswitchontodatabase atanytime.
- Thisprojectwasdevelopedtogrowt hemushroomsbyreducinglessmanpower.S o, this technique shouldbeknowntothe farmerwhogrows mushrooms.

2.1.3Non-FunctionalRequirements

Nonfunctionalrequirementsdefinethesyste mpropertiesandconstraintsthatarise throughuserneeds,becauseoftheneedforinteroperabil itywithothersoftware.The Nonfunctionalrequirements are:

Performanceconstraints:

Inourprojectaswareusingthedifferenthard wareequipmentlikei2cLCD,MQ2,

NodeMCU,dht11allareconnectedtoeachother.These deviceswillperformtheirtasks accordingtothe codesystemprovides veryfastresponse.

Accuracy:

WeareusingMQ2sensorwhichisusedtosense theconcentrationofgassesand dht11sensorwhichis usedtodetectthehumidity.

Usability:

Theuserneednotworryaboutworkingofthed evicetheyneednotknowaboutthe codingpart,theywanttoknowabouttheinformationho wthesensorswillworkandsends the data.Sothattheycan easilyunderstandhowthe device willwork.

2.1.4SystemRequirements.

The systemrequirementsfor this applicationare

- Userhas tobuythis device andfixit.
- The devicewillworkinbothdaytime andnighttime.

2.3FeasibilityStudy

ThemainobjectiveofthefeasibilitystudyistotestTechn ical,OperationalandEconomical feasibilityforaddingnewmodulesanddebuggingoldru nningsystem.Allsystemsare feasibleiftheyaregivenunlimitedresourcesandinfinite time.Thereareaspectsinthe feasibility studyportionofthe preliminaryinvestigation:

- Technicalfeasibility
- Operationalfeasibility
- Economic Feasibility

3. TECHNICALFEASIBILITY

Technicalfeasibilityreferstotheabilityofthe processtotakeadvantageofthe currentstateofthetechnologyinpursuingfurtherimpro vement.Thetechnicalcapabilityof the personnel as wellas the capabilityoftheavailabilitytechnologyshouldbe considered.

Evaluatingthetechnicalfeasibilityisthetricki estpartofafeasibilitystudy.Thisis becauseatthispointintime,nottoomanydetaileddesign ofthesystem,makingitdifficult toaccessissueslikeperformance,costson(onaccountof thekindoftechnologytobe deployed)etc.Anumberof issueshavetobe consideredwhile doingatechnicalanalysis.

Inour applicationwehave usedthesoftwarelikeaurdinoIDEandthings boardwhich arecosteffectiveandeasytounderstand.Onlyforthedev elopmentofthesystemminimum chargesarerequiredandthetechnologiesusedaregener alinnatureandknowntomanyof thetechnicalprofessionals.Soourprojectis technicallyfeasible.

Understandthedifferenttechnologiesinvolv edintheproposedsystembefore commencingtheprojectwehavetobeveryclearaboutw hatarethetechnologiesthatareto berequiredforthedevelopmentofthenewsystem.Find outwhethertheorganization currentlypossessestherequiredtechnologies.Isthereq uiredtechnologyavailablewiththe organization?

OperationalFeasibility

Thisstudyiscarriedouttocheckthee economici mpactthatthesystemwillhaveon theorganization.Theamountoffundthatthecompanyin vestsontheresearchand developmentofthe projectislimited.The expenditures mustbejustified.Thus the developed applicationiswithinthebudgetandthiswasachievedbe causeofmostofthetechnologies usedarefreelyavailable.

ECONOMICALFEASIBILITY

Thisinvolvesthefeasibilityoftheproposedpr ojecttogenerateeconomicbenefits.A benefitcostanalysisandabreakevenanalysisareimport antaspectsofintangibleaspectsof aprojectshouldbetranslatedintoeconomictermstofaci litateaconsistentbasisfor evaluation.Economicfeasibilityattempts2weighthec osts ofdevelopingandimplementing anewsystem,againstthebenefitsthatwouldaccusefro mhavingthenewsysteminplace. Thisfeasibilitystudygivesthetopmanagementtheecon omicjustificationforthenew system.

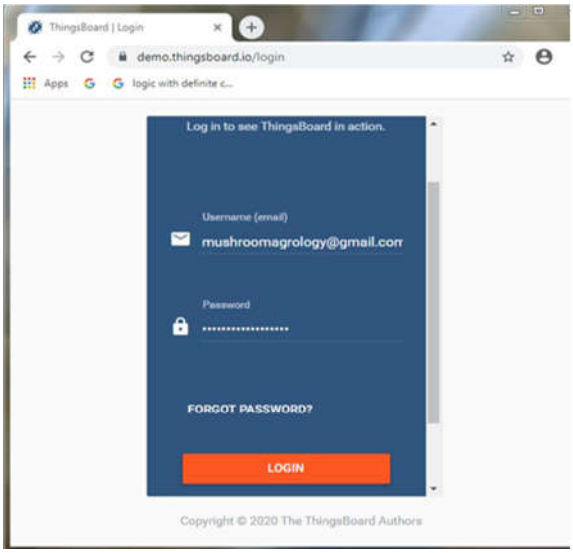
Asimpleeconomicanalysiswhichgivestheac tualcomparisonofcostsandbenefits aremuchmoremeaningfulinthiscase.Inaddition,thisp rovestobeausefulpointof referencetocompareactualcostsastheprojectprogress es.Therecouldbevarioustypesof intangiblebenefits onaccountof automation.Thesecouldbevarioustypesincludeincrea sed customersatisfaction,improvementinproductquality betterdecisionmakingtimelinesof

information,expeditingactivities,improvedaccuracy ofoperations,betterdocumentation and recordkeeping,faster retrievalof information.

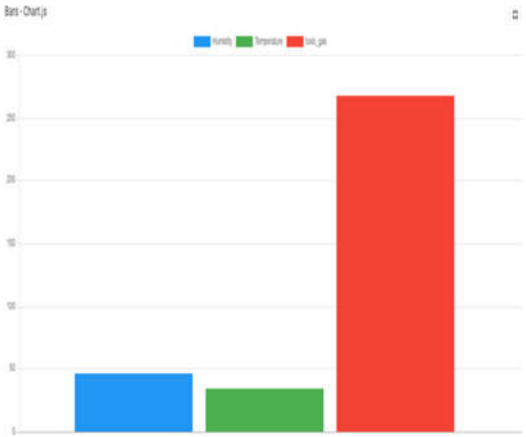
4. OUTPUTSCREENS

Outputscreens:

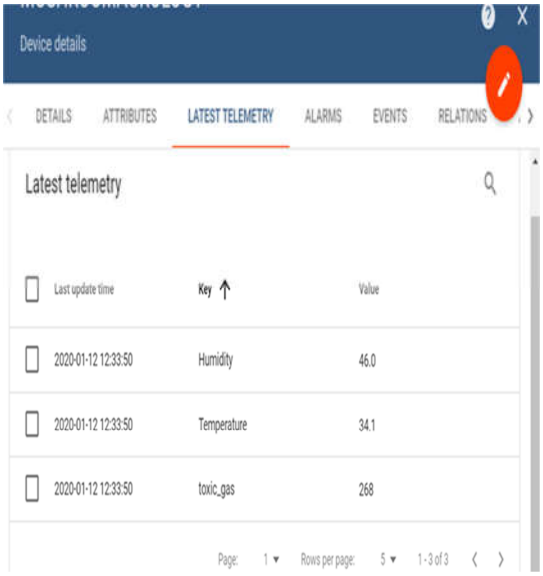
Loginscreen:



BarChart:



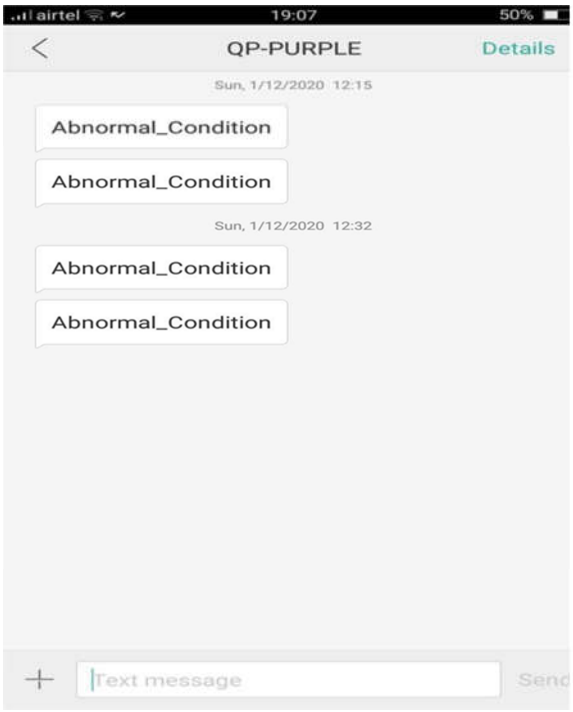
Report:



LCDDisplay:



Message:



ConclusionandFutureEnhancement

MushroomAgrologyhelps the farmers real timecontrolledandmonitorin environmentalawarecontextparameters suchas temperature,humidity,air quality,lightintensityandcontrollingfilterfan,ventilationwindow.This smart systemcaneffectively controlthefarmfromanylocationand reduces costtime andmanpower. This willimprove productivityandqualityofMushrooms.

FutureEnhancements

Thesystemisfullyanautomaticsystemtomonitorandcontrolthe environmentalchangessuchastemperature,ammonia gas,andintensityof light. This papercanbe extendedby automating

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