

NIRMAL SEEDS PVT. LTD., PACHORA



Nirmal Doot



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*Biological Agro inputs for
Sustainable Agriculture*





स्वतंत्रता दिवस के अवसर पर
निर्मल परिवार के सभी सदस्य गण,
वितरक तथा विक्रेता एवं किसान भाईयों
को हार्दिक शुभकामनाएँ !!!

निर्मल परिवार

प्रतिक्षा का हो गया अंत
मिल गया.....
जो चाहिए.....अपने मन का.....

बेहतरीन और शक्तिशाली
सर्वश्रेष्ठ जैविक उत्पाद
निर्मल बायोपॉवर गोल्ड
नया तंत्रज्ञान-नवाचार के साथ
(मायकोराईजल जैव उर्वरक)



Infrastructure Expansion : New High-tech laboratory facilities for production of Mycorrhizae & establishment of Quality Assurance (Seeds) laboratory

Hon. CMD sir along with Heads of Departments observing construction progress of New High-tech Bio input manufacturing facility for Bio-Power (Gold) & High-tech QA Laboratory





विज्ञान तंत्रज्ञान से ही होगी सदाबहार दुसरी हरित क्रांती



एस. एस. पाटील



पी. ए. दळवी



रवि चौरपगार

भारत को आर्थिक स्तर पर सक्षम बनाने हेतु जागतिकीकरणों की चुनौतियों का सामना कर भारत ने मुक्त व्यापार व्यवस्था का स्विकार किया। समय के अनुसार बदलाव का स्विकार कर नये प्रयोग, नये तंत्रज्ञान का उपयोग कर अनेक क्रांतीकारक फैसले अपनाकर भारत ने आज सबसे अधिक जलद गती से विस्तारीत होनेवाली अर्थव्यवस्था का परिचय दिया है। इसमें सबसे अधिक तथा महत्वपूर्ण भूमिका कृषी क्षेत्र की रही है। सामाजिक सुरक्षा, आहार पोषण सुरक्षा में अहम हिस्सा कृषी क्षेत्र का रहा है।

कृषी क्षेत्र में बहोत बड़ी प्रगती हुई। इसका कारण है बेहतरीन अनुसंधान एवं तंत्रज्ञान। भारत में कृषी अनुसंधान विभिन्न स्तरों पर किये जाते हैं। जैसे की, भारत कृषी अनुसंधान परिषद, राज्य-स्तरीय अलग अलग कृषी विश्वविद्यालयों, सी.एस.आय.आर., निजी क्षेत्रों, विज्ञान व तंत्रज्ञान मंत्रालय और उद्योग मंत्रालय जैसे कृषी विभागों के केंद्रीय विभाग अंतर्गत कई संस्थायें अनुसंधान-अध्ययन कार्यों में व्यस्त हैं। इन सभी के संयुक्तीक एवं निरंतर प्रयासों के कारण भारत एक नई शक्ति के रूप में उभरकर भारतीय कृषी क्षेत्र गौरवशाली बना है।

विकास एक शाश्वत प्रक्रिया है, और यह मानव के परिपूर्ण जीवन के लिए प्रभावशाली होती है। कोई भी विकास का घटक प्राकृतीक स्रोत होता है। उसका उपयोग समझ परखकर एवं अधिक गहराई से करना जरूरी है। परंतु कृषी, उद्योग एवं सेवा क्षेत्रों में जिस प्रकार भारी मात्रा में विकास हासिल हो पाया है इस कारण पर्यावरण तथा वातावरणजनित परिस्थितियाँ बिघडी हुई हैं। पर्यावरण की सावधानी बरकरार रखकर ही आगे कदम रखना अनिवार्य है। अनुसंधान तथा अध्ययन की दिशा निश्चित करनी होगी। अनुसंधान एवं अध्ययन व्यापक होते हैं। वह केवल प्रयोगशाला तक सिमित ना रहे। अनुसंधान यह विषय प्रयोगशाला के लिए खुबसुरत गहनं या सुंदर आभुषण नहीं है, वे भविष्य का आयना है, इसलिए अनुसंधान, अध्ययन को प्रयोगशाला से खेतों तक (Lab To Land) पहुँचाना-पहुँचाना चाहिए। याने इस हृदय से उस हृदय तक उतरना चाहिए। वैज्ञानिक-किसान-विज्ञान का सेतु बांधकर वैज्ञानिक दृष्टिकोन, आत्मविश्वास बढ़ाकर संतुष्टता तथा इच्छाओं की पूर्ती करना यह अनुसंधान की सफल कामयाबी है।

आज वैश्विक स्तरपर भारत की पहचान युवाओं का देश ऐसी है। खेती करनेवाले अधिकतम किसान कम उम्रवाले युवा हैं। कृषी शिक्षा पदवी प्राप्त विद्यार्थी हैं। अनुभव की माध्यम से ज्ञान व कौशल प्राप्त करने वाले प्रगतीशिल किसान हैं। इन सभी शक्ति को संगठित कर इन्हीके माध्यम से ज्ञान का फैलाव व्यापकता से करना होगा। इससे प्रयोगशाला और जमीन दरम्यान कोयी अंतर नहीं होगा। कृषी क्षेत्र में वैज्ञानिक प्रगती व नए तंत्रज्ञानों के फैलाव के कारण भारतीय कृषी क्षेत्र अधिक व्यापक बना है।

कृषी क्षेत्र की समस्या, कठिनाईयाँ सुलझाने की क्षमता भारतीय कृषी संशोधन व विकास में है। खेती क्षेत्र के सामने चुनौतियाँ हैं, इसके साथ किसानों का कल्याण करने हेतु ध्यान देने की आवश्यकता है। मौसम व्यवस्था विकसित करना जरूरी है। पूर्व अनुमान-पूर्व जानकारी अवगत होने से कृषी क्षेत्र में जागृकता निर्माण होगी। इंडिया और भारत अर्थात शहर और गांव में जो दुरीया है वह आर्थिक विषमता दर्शानेवाली है। इसे दुर करना होगा।

खेती के शाश्वत विकास प्रक्रिया में सिंचाई एक कडी समस्या है। शाश्वत खेती विकास हेतु एक महत्वपूर्ण कदम याने सिंचाई क्षेत्र में विस्तार करना, खेती सुधार कार्यक्रम, बाजार व्यवस्था आदी में अहम बदलाव लाकर दिर्घकालिन समाधान ढुँढने की आवश्यकता है। खेती पर होने वाले जलवायु बदलाव के कारण अनाज सुरक्षा की समस्या उग्र बनने की आशंका है। बदलते हुए मौसम का प्रतिकार करनेवाली खेती पध्दति, मौसमपुरक फसल प्रणाली और उचित नीति का स्विकार करना महत्वपूर्ण है।

हरित क्रान्ती, निल क्रान्ती, धवल क्रान्ती के बाद सदाबहार क्रान्ती की दिशा में कदम उठाने की जरूरत है। कृषी की आर्थिक क्षमतासे ही भारत समृद्ध और वैभवशाली बन सकता है, इसके लिए सुचना-जानकारी व संचार तंत्रज्ञान अहम भूमिका अदा कर सकती है। इस तंत्रज्ञान का उपयोग बडे पैमानेपर होना चाहिए। किटों के नियंत्रण के लिए जिन किट-नाशक दवाओं का उपयोग किया जाता है उन रसायनों के प्रती किटों में प्रतिकार क्षमता (प्रतिरोधकता) निर्माण हो रही है, यह किसानो के सामने गंभिर समस्या है।

इसपर शाश्वत विकास प्रक्रिया के माध्यम से समाधान ढुँढना चाहिए। मौसमचक्र और जलचक्र यह दोनो विषय अनुसंधान-अध्ययन दृष्टिकोन



कृषी क्षेत्र में विज्ञान एवं तंत्रज्ञानों के कारण जो परिवर्तन एवं बदलाव आये हैं, निश्चितरूप से अनेक सुअवसर प्राप्त हुए हैं। इन सुअवसरों का स्वर्णिम लाभ पाने हेतु तंत्रज्ञानों का उपयोग सही समय और उचित जगह किया जाये तो निश्चितरूप से खेती की उपज क्षमता बढ़कर किसान समृद्ध होंगे और दुसरी सदाबहार हरीत क्रांती निर्माण होकर भारत विश्वस्तर पर एक महासत्ता बनने से कोई रोक नहीं सकेगा।

से महत्वपूर्ण है। मौसम बदलाव के कारण होने वाले परिणाम और इसकी उग्रता का ध्यान रखकर पर्यावरण का संवर्धन करना समय की पुकार है। कम पाणी में आनेवाली फसले, मौसमपुरक फसल प्रणाली और कम समय में आनेवाली फसलें, उनकी गुणवत्ता और टिकने की क्षमताओं पर अधिक अध्ययन की जरूरत है। इस आधुनिक युग में स्मार्ट खेती का विकल्प स्विकारना चाहिए। कृषी क्षेत्र में रोजगार निर्माण की अधिक क्षमता है। खेती एक उद्योग है और किसान उद्योजक है। किसानों को प्रेरित कर इनमें प्रतियोगिता निर्माण करना चाहिए। प्रतियोगिता से उत्पादकता में वृद्धि होगी। कृषी और गैर कृषी घटक एकसाथ आकर ग्रामविभागों में सामाजिक अभियान संचलित कर ग्राम विकास प्राप्त किया जाये तो निश्चित रूपसे खेती की उपज, उत्पादकता बढ़कर किसान समृद्ध होंगे।

ट्रान्सजेनिक या जनुकीय तंत्रज्ञान इक्कीसवीं सदी में निर्णायक एवं महत्वपूर्ण साबित होगा। इसके आगे का महत्वपूर्ण अनुसंधान याने पोषण मुल्यता से सुधारीत बेहतरीन अनाज जिसे बायोफोर्टीफिकेशन कहते हैं। जैसे की लोहयुक्त बाजरा, झिक युक्त गेहूँ, ए और ई जीवनसत्वों से युक्त समृद्ध चावल, सोयाबिन और कॅनोला से प्राप्त अधिक स्वास्थ्यवर्धक तेल। इस प्रकार यह अनुसंधान काफी महत्वपूर्ण होकर सभी के लिए पोषण मुल्यता प्रदान करता है। वंचित और छुपी भुख में महत्वपूर्ण भुमीका निभा सकता है। ऐसे तंत्रज्ञानों का उपयोग और इन अनुसंधान के अलावा संभावना के बाहर जाकर नए अनुसंधान, अध्ययन की दृष्टी बरकरार रखनी चाहिए। खेती का विकास तथा प्रगती को सही मायने में जानना हो तो किसानों की उपज, पैदावार एवं आमदनी में कीतनी वृद्धि हो पाई है।

यह देखना होगा। कृषी क्षेत्र में विज्ञान एवं तंत्रज्ञानोंके कारण जो परिवर्तन एवं बदलाव आये हैं, निश्चितरूप से अनेक सुअवसर प्राप्त हुए हैं। इन सुअवसरों का स्वर्णिम लाभ पाने हेतु तंत्रज्ञानों का उपयोग सही समय और उचित जगह किया जाये तो निश्चित रूपसे खेती की उपज क्षमता बढ़कर किसान समृद्ध होंगे और दुसरी सदाबहार हरीत क्रांती निर्माण होकर भारत विश्वस्तर पर एक महासत्ता बनने से कोई रोक नहीं सकेगा।

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अपने लक्ष्य तक पहुंचना है तो आत्मशक्ति आत्मविश्वास को जागृत करना होगा। परिश्रमों के प्रती हमारी उमंग और तरंग होनी चाहिए। हाथ पर हाथ रखकर बैठना यह मानव पुरुषार्थ नहीं है। प्रतिकुलताओं से न डरकर अपने कर्तव्यवर आरूढ होकर रहना चाहिए। हमेशा हसते या मुस्कूराते रहना चाहिए।



हमारी गृहपत्रिका निर्मल दुत के माध्यम से आप सभी को संबोधित करते हुए मुझे बेहद खुशी हो रही है। निर्मल दुत एक ऐसा प्रकाशन है जो हमें हमारी अपनी परियोजनाओंके लिए सुझाव देता है, अनेक विभागों की खबरे देता है तथा हमारे में जो निर्मल बंधन है जिससे हम जुड़े हैं, उस बंधनको मजबुत बनाने में मदद करता है। सभी को संपर्क में रखता है। साल में दो बार अपने साथी, निर्मल सदस्यों के साथ मेरे अपने शब्दों से सीधे बात करने का, संपर्क करने का अवसर है। इसलिए मैं इस अवसर की और निर्मल दुत की बहोत कद्र करता हु।

निर्मल आधारिक सिद्धांत है – निर्मल मन याने प्यार भरा दिल। प्यार से सेवा करो। दिल से काम करो व्यावसायिक सेवा का मतलब है अपने कारोबार के जरिये समस्त किसान समुदायों की सेवा करना। यदि हम कृषक समुदायके प्रति न्यायपूर्ण रहेंगे, सहायता करेंगे तो हमें नाज होंगा की हम मुल्यवान व्यावसायिक सेवा करते हैं। निर्मल में जो लोग काम

करते हैं उनको इसलिए चुना है की वे कार्यक्षम है, विश्वासयोग्य है, न्यायपूर्ण और समर्पित है। निर्मल की परख निर्मल के सदस्योंकी काबिलीयत के आधार परही कि जाती है।

इस साल हमने एक बड़ा विजय रखा है। उसके मुताबीक जो बड़ा लक्ष्य तय किया उसको हासिल करने के लिए बहुत सारे बदलाव किए गये। कुछ उल्लेखनिय निर्णय किये गये। आवश्यकता के अनुसार परियोजनाएं बनायी गयी। अलग अलग रूपसे सभी विभागो के लिए समय के अनुसार प्रशिक्षणों के कार्यक्रम किए गये। अनेकों को प्रोमोशन दिया गया। लक्ष्य पुर्ति के लिए जो प्रस्ताव समक्ष आए वो सारे मंजूर किये गये। आपके पास श्रमशक्ति (मैनपावर) भी अच्छा है, जहां नहीं था वहा बढ़ाया गया। सभी को सुविधाएं भी उपलब्ध करवायी गयी। इसका मतलब यही है की हमें काम करने में या सफलता मिलने में कोई रुकावट या दिक्कत ना आये। ये सारी चिजों को देखते हुए, बदलाव का समाधान



महसूस करते हुए और भविष्य की सोच रखते हुए रणनीतिक रूप में हम काम कर रहे । और उसका परिणाम या नतिजा संतोषजनक ना हो तो यह अस्वाभाविक होगा । और आपसे यही उम्मीद है । जो लक्ष्य हम हासिल करना चाहते हैं उसके प्रति हमारा समर्पण कितना है, दिशा कौनसी है और प्रयासों में स्थिरता, निरंतरता कितनी है यह देखना होगा । इस जंग में जित हासिल करने तक लड़ने के लिए हमें आपकी ताकद की जरूरत है और आपके पास हर तरह की उपलब्धी हासिल करने की ताकद है ।

खरीफ मौसम तो निकल गया और अभी रब्बी शुरू होने वाला है । खरीफ मौसम के आरंभ में आपने जो लक्ष्य प्राप्त करने की योजना बनाई थी, दिशा तय की गई थी, क्या उसी दिशा में आपका सफर हो रहा है ? उचित ढंग से कार्य किये जा रहे हैं । हम अपने मकसदसें भटके तो नहीं, ये हमें देखना बहोत जरूरी है । हमें पिछे मुड़कर अपने व्दारा किये गए कार्योंको देखना है और अपनी प्रगति को खुद के लिए निर्धारित किये लक्ष्यों की तुलना में मापना है । हमें जानकारी होना चाहिए की हमें अभी और कितना कार्य करना है । वो ही आगे बढ़ते हैं जो सुरज को जगाते हैं, वो पिछे रह जाते हैं जिनको सुरज जगाता है । हमेशा जागृत रहनेवाले ही बुलंदीयों को हासील करते हैं । जब हम उस तरह की प्रगति नहीं कर पाते हैं जितनी हमें करनी चाहिए थी । जरा अपने याने निर्मल के संसाधन की ओर देखें । कितना बडा इन्फ्रास्ट्रक्चर है, कितनी सुविधायें हैं ।

सब्जीयाँ, सिरियल, दलहनी एवं तिलहनी, फसलों में कितना अच्छा काम है, खासा नाम है और जैविक उत्पादों में बडी श्रेणी है । इतनी बडी उपलब्धी होने के बावजूद भी क्या आप अपने संसाधनों को अत्याधिक अस्सरदार तरीकों में उपयोगित कर रहे हैं ? आप अपनी सारी ताकद कहा लगा रहै है ? जरा सोचिये, जो लक्ष निर्धारित किया उसपर ध्यान देना जरूरी है । उस अवसर की कद्र करो जो संभव बनाता है । और अपनी प्रक्रियाओं का, क्षमताओं का विश्लेषण करो । किसान समुदाय को समृद्ध तथा अधिक उज्वल भविष्य दिलाने उनको प्रगति के पथ पर लाना यही हमारा मकसद है । और हर गांव में, हर खेत में, हर कोनों में जाकर उनकी मदद करना, सेवा करना हमारी प्राथमिकता है । साथ ही साथ निर्मल को भी बढ़ाना है । परंतु यह काम कोई अकेला नहीं कर सकता । केवल कोई एक व्यक्ती या कोई एक विभाग पर नभर रहना उचित नहीं होगा, न्यायपूर्ण नहीं होगा । इसकी जिम्मेदारी हम सभी पर है । यह टिमवर्क है । सभी विभागों के विभाग प्रमुखों का यह उत्तरदायित्व है की हम मिलकर काम करें । सेवा को अपनी प्राथमिकता बनाकर निर्मल को अधिक मजबुत करने के लिए, अपना कारोबार बढ़ाने के लिए दृढ संकल्प करें । हर विभाग का कार्य भिन्न हो है । अपना अपना लक्ष्य पुरा करने लिए रणनीतिक रूप में कार्य करें । जब सारी शक्तियां एकजुट होकर अपने कार्य को निष्ठा और

समर्पण के साथ करेंगे तो आनेवाले समय में वो दिन दुर नहीं होगा, जिसकी हम प्रतिक्षा कर रहे हैं । इतिहास के पन्नों पर सबसे उपर निर्मल ही होगा । आसमान की बुलंदियों को छुने से हमें कोई नहीं रोख पायेगा । वचन की सफलता का सारा दारोमदार कर्मशीलता में है । कथनी और करनी में जमिन आसमान का अंतर होता है । तुम्हारी सत्यता तुम्हें दृढ बनायेगी और तुम्हारी दृढता तुम्हें लक्ष तक ले जाएगी । अपने उत्तरदायित्व को समजना चाहिए । प्रत्येक क्षण और अवसर का लाभ उठाए । अपने संपूर्ण आत्मबल के साथ कार्य में लगने से लक्ष्य हासिल होता है । जीवन को यज्ञमय बनाना ही सच्ची दुरदर्शीता और बुद्धिमत्ता है । आत्मसमर्पण की तैयारी होनी चाहिए । जब तक अपना लक्ष्य प्राप्त नहीं होता तब तक रुकना नहीं चाहिए । परिस्थितियाँ हमारे अनुकूल नहीं है ऐसी शिकायतें निरर्थक है । आत्मशक्ती और आत्मविश्वास जागृत करो । नवनिर्माण के लिए हम काँटो से भरे रास्तों का स्वागत करेंगे और आगे बढ़ेंगे । मुझे पुरा विश्वास है कि जो लक्ष हमने तय किया वो आसानी से हासिल होगा ।

आर.ओ.पाटील
चेयरमेन तथा प्रबंध निदेशक



Biological AGRO INPUTS for sustainable AGRICULTURE

M. S. Paprikar
(Microbiologist)

Nirmal Seeds realized this issue of agricultural productivity and actively contributed since last 20 years by way of developing various Bio organic agro inputs based on extracts of bacteria, sea weeds, blue green algae and various bio inoculants for management of various pests and pathogens.

Agriculture is the backbone of the economic growth of any Country. Crop productivity was always a prime important area which is monitored with due care, as it caters food requirement of growing populations. Green revolution (GR) has increased productivity per hectare by using high yielding hybrids and improved varieties of cereals crops, fertilizers, pesticide application and intensification of Agriculture. In spite of this, the productivity rate is not reached upto the desired level. Poverty and food insecurity persisted despite the GR success. Expected agricultural productivity needs to be doubled to sustain need of food requirement of growing population.

On one side Agricultural land is decreasing due to massive urbanization and Industrial growth and on the other end Agricultural productivity is decreasing due to drastic climatic changes especially increased temperature, water scarcity, loss of soil fertility due to indiscriminate use of

chemical fertilizers and pesticides, increased pest/pathogen resistance to various chemical pesticides. Production cost of agricultural products are increasing due to rise in prices of fertilizers and pesticides. Farming community is immediate sufferer of this issue and ultimately, it is reflected in overall economy of the Nation.

Since agriculture has potential for food security, environmental sustainability and economic opportunity worldwide, the future vision of the world is to adopt new strategies to increase agricultural production sustainably.

Now, there is need of II Green Revolution which is based on principles of Integrated Nutrient /Pest Management and Organic farming. Fortunately, Government of India is also promoting IPM/INM and Organic farming based agriculture which is safe for environment, soil, water and aslo it is efficient and economically viable.

Nirmal Seeds realized this issue of agricultural productivity and actively contributed since last 20 years by way of releasing various Bio organic agro inputs based on extracts of bacteria, sea weeds, blue green algae, various bio inoculants viz, Mycorrhizal bio-fertilizers, Phosphate Solubilizing Bacteria, Potash Mobilizing Bacteria, Nitrogen Fixing Bacteria, Decomposing bacterialcultures, Antagonistic/entomopathogenic microbes for management of various pests and pathogens and botanical bio pesticides etc.

All products are derived from natural sources and are effective in management of nutrients, pests and pathogen and helps to reduce production cost by reducing chemical input's cost. Especially, microbial cultures like Mycorrhiza, Phosphate Solubilizers, K. Mobilizers, N fixers and antagonistic agents if, applied once proliferate in soil and becomes a part of native microflora of soil and further contribute for increasing soil fertility. Mycorrhizal Biofertilizers provides nutrients to crops which are present in deep soil where roots can not reach. Bio products like Bio Power /dextrose based Biofertilizers/ antagonistic microbes can also be applied through drip system, which reduces application cost to farmers. Granular Bio products increases water holding capacity of soil, aeration in soil and imparts stress tolerance to crops during adverse climatic situations. Botanical biopesticides and surface active agents reduces doses of chemical pesticides. All above bio products are recommended/suitable for INM/IPM programme and Organic Farming.





Nirmal's Bio products with their specifications and merits.

S.N	Technical name	Specification	Brand Name	Advantages
1	Mycorrhizal Biofertilizers	5 Lakh AM Propagules/ha or 25 kg /hectare	Bio Power Gold	It increases availability of nutrients & water. Imparts stress tolerance to crops.
2	Potash Solubilizing Bacteria	CFU Count 5×10^7 per gram (min)	Bio Pick Up DX	Effective mobilization of Potash to plant
3	Phosphate Solubilizing bacteria		Bhuparis PSB	Use of phosphatic fertilizers can be saved upto 20 - 30 %. and helps to reduce cost of production.
4	Azotobacter spp		Bhuparis AB	It fixes atmospheric nitrogen and make it available for plants.
5	Azospirillum Spp		Bhuparis AZ	
6	Rhizobium spp		Bhuparis RB	Within one year 20 to 50 kg of nitrogen is fixed per hectare.
7	Bio Organic Manure	It contains Macro and Micro elements	Paripurna	Improves aeration and water holding capacity of the soil, improves soil, structure and texture.
8	Decomposing Bioinoculants	Cellulolytic and lignolytic species of microbes	Bhuparis DB	Decomposition of waste into Manure
9	Bacterial and BGA extract	Contains amino acid, soluble proteins, Macro and Micro elements etc	Bio Power granules	Improves yield and quality of fruits, vegetables, flowers and commercial produce
10			Bio Power liquid	
11	Extract of BGA and Sea weeds	Contains amino acid, Macro and Micro elements etc	Bio Force	It increases number of leaves and leaf area significantly, thereby increase in yield. Early flowering & fruiting, therefore early harvest.
12	Concentrated Extract of BGA and Sea weeds		Berrylon	
13	<i>Trichoderma viride</i> 1% WP	CFU Count 2×10^6 per gram (min)	Bhuparis Tricho	Effectively control wilt, root rot, damping off diseases of cereals, pulses, vegetables and fruit crops.
14	<i>Pseudomonas fluorescens</i> 0.5% WP	CFU Count 2×10^8 per gram (min)	Bhuparis Pseudomonas	<i>Pseudomonas</i> protects plants from bacterial, fungal diseases. Helps in plant growth
15	<i>Verticillium lecanii</i> 1.15 % WP	Spore count 1×10^8 per gram (min)	Trident	For Control of Aphids, Scales and Thrips
16	<i>Beauveria bassiana</i> 1.15% WP	Spore count 1×10^8 per gram (min)	Jasper	For Control of Boll worm, Spodoptera, Rice leaf folder, <i>Plutella</i> etc.
17	<i>Photobacterium luminescens</i> 0.5% EC	CFU Count 1×10^9 cells/ ml (min)	Bio Prahar	For effective control of Mealy bugs, Woolly aphids & Diamond Back Moth
18	<i>Metarhizium anisopliae</i> 1.15 %WP	Spore count 1×10^8 per gram (min)	Emerald	For control of White grubs, Beetle grub, Caterpillar etc
19	<i>Azadirachtin</i>	1500 PPM	Magik Hit 1500	Effective against Mite

If all components of agricultural sectors work together to achieve common goal of sustainable agriculture definitely, India will be the Global market leader and landmark for sustainable agriculture revolution



Biopower Gold

(Mycorrhizal base Biofertilizer) :

A economical and viable supplement for organic and INM farming

Valmik M. Patil
(Research Officer)

Nirmal has made the technology transfer agreement with TERI (The Energy & Resources Institute, New Delhi) for research and production of Mycorrhizal fungi. TERI has developed root organ culture technology for cultivation of Arbuscular Mycorrhizal fungi (AMF) and transferred this technology to Nirmal Seeds Pvt Ltd. Recently the company has launched new Mycorrhizal Biofertilizer by the brand name “**Biopower Gold**”.



It is currently estimated that the world's population will exceed nine billion by 2050 (Rodriguez and Sanders, 2015). Thus, global agriculture will have to face the task of almost doubling food production but also of reducing the dependency on agrochemicals, in order to fit our farm produce for export, to safeguard humans and environmental health. Thus there is a need to implement eco-friendly technologies, such as Mycorrhizal based biofertilization. Despite its enormous potential, the application of Mycorrhizal fungi has not been fully adopted by farmers so far.

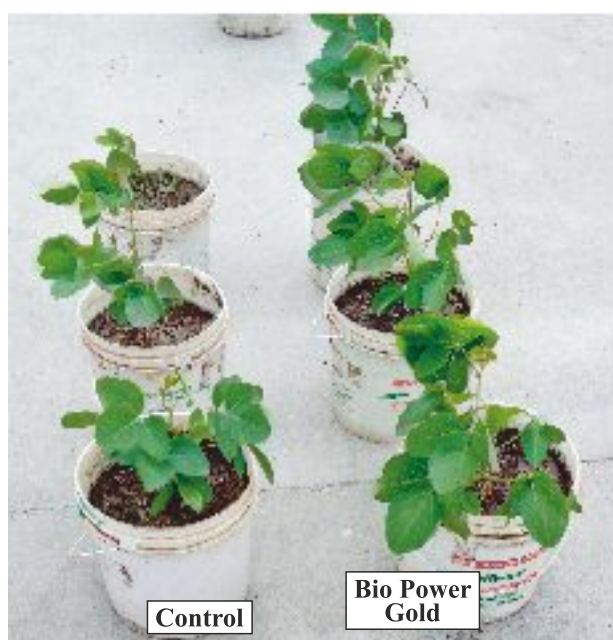


Fig: Effect of Biopower Gold (Mycorrhizal biofertilizer) on growth of Soybean

What is Mycorrhizae ?

Mycorrhizae are a symbiosis or close and long term relationship between host plant and mycorrhizal fungus. The word mycorrhizal means “fungus root” in Greek. There are two main types of Mycorrhizae. Endomycorrhizae and Ectomycorrhizae. Endomycorrhizae have an exchange mechanism inside the root (and the hyphae extend outside the root). Endomycorrhizal fungi form mostly with green leafy plants and most commercially produced plants. Examples: Most Vegetables, Grasses, Flowers, Shrubs, Fruit Trees, and Ornamentals. Ectomycorrhizae live only outside of the root. Ectomycorrhizal fungi form mainly with Conifers and Oaks. They are required only for a small percentage of woody type plants/trees.

How do Mycorrhizae work?

The symbiotic relationship between plants and the Mycorrhizal fungus is mutualistic or mutually beneficial. Mycorrhizal fungi comes in contact with plant roots and helps plants to obtain nutrients and water from the soil through the fungus. In exchange, the plant provide sugar/feed to the fungus which produces by plants during photosynthesis, thus the relationship is beneficial to both.

Why Mycorrhizal Biofertilizer:

1. Most of the soils contain mycorrhizal fungi, but often



- at low level and which is insufficient for adequate colonization.
2. Research indicated that many common practices can decrease the Mycorrhizal count in soil.
 3. Therefore reintroduction of mycorrhizal fungi in a soil where they have been lost can dramatically improve the plant performance with less water and fertilizer.
 4. Mycorrhizal fungi increases the surface absorbing area of roots 100 to 1000 times, thereby greatly improving the ability of the plants to access soil resources.
 5. Mycorrhizal fungi increase nutrient uptake not only by increasing the surface absorbing area of roots, but also release powerful enzymes into the soil that dissolve hard to capture nutrient such as organic nitrogen, phosphorus, iron and other tightly bound soil nutrients.
 6. It has been reported that Mycorrhizae fungi colonized on plant roots and provide between 70 to 100% of their phosphate directly from these fungus tendrils. An enormous mineral boost which ultimately reduces the dependency of phosphate other nutrient supplementing fertilizers of farmers.
 7. Finding a replacement for mined phosphate is a critical issue because the big phosphate mines are now depleted to the point where they are expected to run out in the next 30 to 50 years. Many experts predicted that “There will be severe 'phosphate crisis in future”

Vision of Nirmal:

Nirmal Management always think and plan by considering the next 20 years scenario of Agriculture. There will be surely chemical fertilizers crises in future. Therefore, Nirmal has made the technology transfer agreement with **TERI (The Energy & Resources Institute, New Delhi)** for research and production of Mycorrhizal fungi. TERI has

developed root organ culture technology for cultivation of Arbuscular Mycorrhizal fungi (AMF) and transferred this technology to Nirmal Seeds Pvt Ltd. Recently the company has launched new Mycorrhizal Biofertilizer by the brand name “**Biopower Gold**”. Number of field trials of Biopower Gold have been conducted on various crops in different agro climatic conditions and recorded excellent results as compared to control(Untreated). Results of recently conducted trial are summarized below.

Effect of different formulations of Mycorrhizal Bio fertilizers on Tomato:

Crop: Tomato-2530, Treatments: 8, Replication : 4 , Dose: 10 Kg per acre

Treatment Details:

- T1 : Control (Untreated)
 T2 : Soil application of Mycorrhizal Bio fertilizer: (0.50 lakh propagules/10kg/acre)
 T3 : Soil application of Mycorrhizal Bio fertilizer: (0.75 lakh propagules/10kg/acre)
 T4 : Soil application of Mycorrhizal Bio fertilizer: (1 lakh propagules/10kg/acre)
 T5 : Soil application of Mycorrhizal Bio fertilizer: (1.5 lakh propagules/10kg/acre)
 T6 : Soil application of Mycorrhizal Bio fertilizer: (2 lakh propagules/10kg/acre) (Biopower Gold)
 T7 : Recommended dose of fertilizer + Soil application of Mycorrhizal Bio fertilizer: (2 lakh propagules/10kg/acre) (Biopower Gold)
 T8 : Soil application of Mycorrhizal Bio fertilizer: (Market Sample of Mycorrhizae)

Table- 1 : Effect of different formulations of Mycorrhizal biofertilizers on vigour contributing characters in tomato crop.

Tr. no.	Avg. fresh root wt. (gm)	Avg. fresh shoot wt. (gm)	Avg. dry root wt. (gm)	Avg. dry shoot wt. (gm)	Avg. root length (cm)	Avg. shoot length (cm)
T1	0.95	8.40	0.50	3.00	11.1	25.1
T2	1.50	12.05	0.80	3.50	13.9	30.6
T3	1.80	16.15	0.80	4.50	14.2	34.9
T4	2.10	15.45	1.00	4.40	14.4	35.9
T5	2.05	15.90	1.10	5.25	15.3	37.4
T6	2.12	17.35	1.20	5.80	15.7	41.2
T7	2.14	18.56	1.30	5.83	15.4	40.9
T8	2.00	14.28	1.22	5.22	14.5	35.6
C.D (0.05)	0.019	0.148	0.074	0.081	2.132	5.742
C.V	0.714	0.682	5.066	1.169	10.516	11.435



Fig: Effect of Biopower gold on growth of Tomato

Results:

The perusal of the data (Table 1), revealed that all the treatments exhibited significantly higher root length, shoot length, fresh root weight, fresh shoot weight, dry root weight and dry shoot weight over untreated control. However, the treatment with recommended dose of fertilizer + soil application of Mycorrhizal Bio fertilizer: (2 lakh propagules/10kg/acre) (Biopower Gold) (T7) recorded significantly highest avg. fresh root weight (2.14gm), avg. fresh shoot weight (18.56gm), avg. dry root weight (1.30gm), avg. dry shoot weight (5.83gm), avg. root and shoot length (15.4cm and 40.9cm) respectively. This was followed by the treatment (T6) with soil application of Mycorrhizal fertilizer (2lakh propagules/10kg/acre).

Conclusion:

Thus, based on this trial, it could be concluded that the soil application of Mycorrhizal Bio fertilizer: (2 lakh propagules/10kg/acre) (Biopower Gold) either with recommended dose of fertilizers or separately; were found effective for increasing root mass and vigour in tomato.

Potential benefits of Biopower Gold:

In addition to the provision of nutrients, other benefits to the plant include:

1. Biopower gold containing mycorrhizal fungi propagules or filaments, **promote drought tolerance in the partner plant by enhancing the water holding capacity of soil.**
2. The outer walls of the filaments contain glue compounds that cause fine particles of earth to clump together, building soil structure and **making the ground less vulnerable to erosion.**
3. Mycorrhizae species of Biopower selectively exclude the **passive uptake of toxic elements limiting the partner plant's exposure to heavy metals, such as lead and cadmium.**

4. At high latitudes, high altitudes and other rocky environments, **mycorrhizal fungi dissolve and take up nutrients from primary rock surfaces.**
5. In saline soils too, the Biopower gold protect plants from **high salt concentrations.**
6. **Biopower gold** containing Mycorrhizal fungi can also **protect plants from pests, like nematodes, and diseases both directly and by promoting plant vigour.**
7. **Biopower gold reduces nutritional deficiencies.** Mycorrhizal species of Biopower gold efficiently bring nutrients (particularly **phosphorus, copper, manganese and zinc**) to the plant where plant roots are not present.
8. Because of Biopower gold there will be potential reduction in fertilizer use.
9. **Delayed wilting.** Biopower containing Mycorrhizae acquire water from the growing medium where plant roots may not access it, which **delays wilting from water stress.**
10. **Improve growth.** Efficient acquisition of nutrients helps the plant maintain its optimal growing rate longer, **so top growth and root growth are not compromised.**
11. **Resistance to salt toxicity.** Mycorrhizae fungi have been found to protect plants from high salt and micro nutrient toxicities.
12. **Biopower gold reduced root disease attack.** Mycorrhizal fungi of Biopower gold help to reduce the effects of stress on plants, making them less susceptible to attack by root rot pathogens.





OKRA :

Challenges, Opportunities and Possibilities.....

Dr. J. C. Rajput (*Director*)

M. B. Patil (*Plant Breeder*)

Nirmal Seeds working on national projects i.e. "Development of okra varieties resistant to YVMV using marker assisted selection" in collaboration with The Energy and Resources Institute (TERI), New Delhi with objectives i.e. Development of Mapping population for YVMV resistance, Phenotyping and genotyping of mapping population, Identification of markers linked to YVMV resistance and their validation and development of okra lines resistant to YVMV.



Okra (*Ablemoschus esculentus* (L) Moench) is an annual, often cross pollinated vegetable crop belongs to Malvaceae family. It is warm season vegetable crop widely cultivated in tropical and subtropical regions of the world. It is commercially important vegetable widely grown in low to high input system for domestic and export markets. India is the largest producer of okra having 504 thousand hectare area and production of 5709 thousand MT, with productivity of 11.5 MT/ha (source-NHB-2015). In India major okra producing states are UP, Bihar, Orissa, West Bengal, AP, KN and Maharashtra.

Okra is well known for its nutritive value because of its vitamin and mineral contents. Okra has many medicinal uses. It is powerhouse of nutrients including soluble fiber in the form of pectin and gum which reduces the cholesterol and lowers the risk of heart diseases. Tuberous roots of some wild okra are used to overcome impotency in human beings by tribal people of India. (chopra, et. al, 1986). Okra reported desirable alkaline pH which helps in relieving effect in gastrointestinal ulcer by neutralizing digestive acid (Wamanda, 2007). Okra mucilage is effective as blood volume expander and has potential to cure renal diseases (Siemonsma and koume, 2004). The okra has many application in fiber, paper, artificial wood industries and jaggery preparations.

Challenges :

1. Narrow variability : Yellow Vein Mosaic Virus (YVMV) disease is the most important hurdle in okra cultivation. So far, Plant Breeders have kept YVMV resistance as prerequisite in okra breeding for getting desirable quality and yield. As a result, selection for resistance is being carried out which resulted in development of genotypes having narrow genetic base. The populations that have a narrow range of genotypes and are more phenotypically uniform may merely fail to adopt and reproduce at all the conditions.

2. Inadequate Biotic Resistance:

YVMV and Enation leaf curl virus (ELCV) are most destructive diseases of okra and causes 32 to 95 per cent economic losses. Major emphasis is being given to develop YVMV & ELCV resistant lines to address the constraints in okra cultivation. Fusarium Wilt (*Fusarium oxysporum* f. sp. *vasinfectum*) disease is caused by fungi, which persist in the soil for a very long time. The fungus invades the root system and colonizes the vascular system. No effective control is available other than a long rotation. Powdery Mildew (*Erysiphe cichoracearum*) disease is found mainly on the older leaves and stems of plants.

The crop is attacked by number of pests of which shoot and fruit borer, leafhopper, whitefly, red spider mite, solenopsis mealy bug and root-knot nematode are most serious, causing substantial reduction in crop growth and yield. The loss in



marketable yield has been estimated to the tune of 50 - 94 % depending upon the stage of crop growth at which the infection occurs.

3. Lack of abiotic Resistance :

Frost tolerance is a crops ability to survive a frost or below freezing temperatures. When air is cooled to below the dew point, dew can be formed on surfaces. If temperatures goes below 2.22°C, the result is frost, which is frozen ice crystals which is dangerous for most vegetable plants. Okra requires temperature range of 22-35°C for normal plant growth. It is cultivated in tropical, subtropical, and warm temperate regions around the world. In fact, it is one of the most heat and drought-tolerant vegetable species in the world. It is very sensitive to frost, plant growth remains stunted below 12°C temperature. Seed fails to germinate below 17°C (Chauhan, 1972). It has been noticed that, narrow sense heritability and genetic advance varied across crosses, traits and stress conditions. For fruit yield, narrow sense heritability and genetic advance were high under non-stress conditions as compared to drought, which indicated that direct selection of fruit yield would only be feasible under non-stress conditions.

4. Limited Heterotic Effect :

Hybrid vigour for yield and quality has been the main driving force for acceptance of okra by the farmers and consumers around the globe including India. All local and open pollinated varieties of okra conventionally grown in the country are currently being replaced by F1 hybrids. It is established that, wide genetic variability for desirable traits is imperative for obtaining high heterosis. In okra YVMV disease incorporation from limited sources leads to narrow genetic variability which prevails in germplasm. Moreover, there is cross incompatibility among the most of the wild relatives of okra due to different ploidy levels. Hence the wild relatives could not be effectively used for development of variability. These factors lead to germplasm with narrow genetic base which shows limited heterosis. Vegetable breeders have widely exploited and used heterosis in boosting up yield of many crops. The goal of okra hybrid breeding is to identify and then reliably reproduce superior hybrid genotypes. Virtually all commercial okra hybrids are made from crosses of inbred lines.

5. Cost of Hybrid seed production:

Large-scale F1 hybrid seed production in okra becomes limited due to the tedious hand-emasculation, followed by hand-pollination, incurring additional labour and higher cost of F1 seed production. Genetic male sterility (GMS) is usually recessive and monogenic, hence, can be used in hybrid seed production.

6. Effect of climate change:

Change in cropping pattern and planting season is major challenge in present situation. Agriculture, which is sensitive to the climate change will react sharply to the changing cropping



pattern and the change in planting season, will put pressure on the breeders to develop adaptable hybrids for these conditions. With changing climatic conditions, the host pathogen interactions will also change. It was observed that more virulent pathotypes are emerging & affecting the crops. Major concerns of growers are disease resistance, pest and drought tolerance. The continuous struggle of developing resistance in vegetable crops is a biggest challenge for breeders.

7. Lack of Post harvest Information: Okra pods are immature fruits and are harvested when they are very tender. Marketable fruits harvested at 3 to 7 days after anthesis. Okra should be harvested when the fruit is bright green, the pod is fleshy and seeds are small. At later stage, the pod becomes fibrous, tough and the green color and mucilage content decreases. Quality losses occur during marketing are often associated with mechanical damage, water loss, chilling injury, and decay. If stored at higher temperatures, the pods loses quality due to dehydration, yellowing and decaying. Pods harvested more than 7 days after fruit set were of poor quality mainly due to an increased crude fiber and a reduction in moisture (Iremiren et al., 1991). The pods harvested with minimum handling and field packaging can retain their green colour, crispy texture with minimum rotting (3.0%) and physiological loss in weight (15.8%) and good appearance upto 13 days of cold storage whereas normal handled pods can be stored up to 5 days at $8 \pm 1^\circ\text{C}$, 90–95% relative humidity (RH) and thereafter fruit lose their general appearance on the 7th day of storage and were unmarketable. Therefore, in order to maintain high quality of okra from harvesting to the final destination (consumer), the okra pods should be harvested with minimum handling followed by field packaging in corrugated fibre boxes (CFB).

Opportunities :

Okra has a good export potential as it accounts for 60% of the export of fresh vegetables. Green, lustrous, tender fruits having 7-10 cm length are preferred in export market. The hybrids with export quality fruits and high yielding ability are preferred



by farmers. At present, the existing hybrids in the market are lacking one or other traits. Hence exploitation of hybrid vigour, understanding genetics of resistance and improvement of quality aspects with an eye on the export market needs to be concentrated in okra improvement programme. India exports okra mainly to UAE, Saudi Arabia, Qatar and Kuwait are the largest. In Europe, the largest importers are the UK, Germany, Switzerland and France. Nearly 35-40 per cent of domestic production from India is exported. Apart from the present export, the Indian people residing in other than mentioned countries like to have okra so it may also increase the export of okra in near-future. Creation of brand is important it may be in the form of state-wise or fruit colour-wise. For regular supply of fresh fruits there is need to provide cold storage facilities near the growing belts.

European maximum residue levels (MRLs) are very low and hence organic or pseudo-organic growing practices have to be adopted to ensure compliance with strict European Union MRLs. Indian seed Industry is one of the most mature and vibrant one in the world currently occupying the 6th position. Hybrid seed production in crops like tomato, hot pepper, sweet pepper, brinjal and okra is a highly labour oriented and capital-intensive activity. Total vegetable F1 seed market is 1500 crores, out of that, okra ranks second which account more than 100 crores worth. Similarly, there is good scope for frozen/dehydrated and canned fruits for internal and external market. However suitable varieties and technologies for this purpose needs to be evolved.

Possibilities :

Eight *Abelmoschus* species occur in India. Out of these, *A. esculentus* is the only known cultivated species. *A. moschatus* occurs as wild species and is also cultivated for its aromatic seeds, while the rest six are truly wild types. The wild species occupy diverse habitats. The species *A. ficulneus* and *A. tuberculatus* is spread over the semi-arid areas in north and northwestern India; *A. crinitus* and *A. manihot* (tetraphyllus and pungens types) in tarai range and lower Himalayas; *A. manihot* (tetraphyllus types), *A. angulosus*, and *A. moschatus* in Western and Eastern Ghats; and *A. crinitus* and *A. manihot* (mostly pungens types) in the northeastern region, depicting their broad range of distribution in different phytogeographical regions of the country.

Exploitation of wild species and distantly related genotype in hybridization will play a major role in variability generation. For this purpose the techniques like protoplast fusion can be explored to develop new genotypes with desirable traits. The advantage of somaclonal variation in okra can be explored to generate variability. Among the conventional techniques mutation breeding is also important for variability generation. Continuous struggle of developing biotic resistance in vegetables, forced to plant breeders to use MAS & RNAi technology for YVMV & ELCV for durable resistance. Frequent

breakdown of YVMV resistance (emergence of polyphagous 'B' biotype of *B. tabaci* with increased host range of more than 600 plant spp.) will be taken into consideration. ELCV resistance should be mandatory for okra improvement. Recently some of the public and private institute are actively involved in okra improvement programme with support of Govt. Of India.

Nirmal seeds private limited working on national projects i.e. "Development of okra varieties resistant to YVMV using marker assisted selection" in collaboration with The Energy and Resources Institute (TERI), New Delhi with objectives i.e. Development of Mapping population for YVMV resistance, Phenotyping and genotyping of mapping population, Identification of markers linked to YVMV resistance and their validation and development of okra lines resistant to YVMV.

Similarly NSPL also working with collaboration with Delhi University on RNAi project entitled "**Development of okra using RNAi constructs**" to develop virus resistant okra lines and hybrids. The companies like MAHYCO, Rasi seeds, Ankur seeds, Bejosheetal and Nirmal seeds etc. are also working on transgenic approaches on okra for development of varieties having abiotic and biotic stress tolerance.

As mentioned earlier okra hybrid are becoming popular among the Indian farmers, number of private seed companies are involved in hybrid development programme. However, the high cost of hybrid seed of okra becomes a limiting factor for adoption of new hybrids among the farmers. It is estimated that, 70 per cent saving in time and manual labour may possible by using GMS base hybridization programme. IIHR, Bangalore has successfully developed promising GMS lines which can be effectively and efficiently used by okra breeders to minimize cost of seed production.





Nirmal's new high yielding and disease resistant Tomato Hybrid NTH-2383

On the basis of disease resistance for early and late blight, TyLCV and groundnut bud necrosis virus (GBNV); the hybrid NTH-2383 is promoted for the multilocal trial testing. The important feature of this hybrid is semi-indeterminate vigorous growth habit with excellent reflusing ability & excellent shelf life.

B. P. Jadhav
(Sr. Scientist Vegetable)

Tomato (*Lycopersicon lycopersicum* (L.)) is the second most important vegetable crop in India next only to Potato. In India it is cultivated over an area of 8.79 lakh hectares (FAOSTAT-2015) with production of 182.26 lakh tones. The average productivity is about 20.7 tones per hectare. In recent years the occurrence of major diseases such as Tomato leaf curl virus (TyLCV), bacterial wilt (BW) and early and late blight have become very serious problems and causing considerable yield loss in major tomato growing belts of the country. Due to TyLCV yield loss has been reported up to 70-80% depending on the stage of attack, bacterial wilt has been reported to cause yield loss up to 70%, where as early blight has become very serious on foliage and fruiting stage and causing yield loss up to 50-60%.

Adoption of multiple disease resistant Tomato hybrid is the most practical way to combat these serious diseases as no chemical application can effectively control them. Considering these problems the research efforts were carried out from last 5-6 year at Nirmal Seeds Pvt. Ltd and screened all the germplasm (1167) accessions at hot spot for early and late blight incidence. From these 1167 lines; 29 lines showed highly tolerance level to early and late blight disease. The first 174 crosses was tested in K-2013 at hot spot with promising checks of the market and from 174 hybrids, 34 hybrids were advanced on the basis of high degree of tolerance to early and late blight disease.

During K-2014 all the 34 hybrids were tested for early and late blight resistance along with TyLCV resistance in three

replication at Dindori (Nashik) location. From 34 hybrids, the hybrids NTH-4062, NTH-3893, NTH-3825, NTH-3960 & NTH-2383 were advanced for third year testing. During K-2016 these four hybrids were tested for early and late blight resistance along with 5 market checks in two location viz. Dindori and Vinchur. On the basis of disease resistance for early and late blight, TyLCV and groundnut bud necrosis virus (GBNV); the hybrid NTH-2383 is promoted for the multilocal trial testing.

Important features of Tomato Hybrid NTH-2383

Growth habit.....	Semi indeterminate
Fruit shape.....	Oval
Av. Fruit weight (g).....	90-100
Fruit firmness.....	Very firm

Special features

- ▶ Semi-indeterminate vigorous growth habit with excellent reflusing ability
- ▶ Attractive deep red colour fruits with profuse fruit bearing ability
- ▶ Very good uniform fruits over the harvests
- ▶ Very firm fruits with excellent shelf life and good transport ability
- ▶ Highly tolerant to TyLCV, early and late blight diseases
- ▶ Suitable for Rainy and Winter season cultivation



Identification of Nirmal's Paddy varieties through Quick Chemical Test

Swapna Deshmukh (Q.A. Officer)
M.T. Sable (Manager Q.A.)

Nirmal Seeds rice varieties got stabilized & occupied major rice growing areas of the Country. Due to narrow genetic base and reduced range of variation among varieties chosen by the farming community coupled with the interest of consumers towards specific grain types of rice varieties, it is often becomes difficult to identify the varieties just by using morphological characteristics. Hence several simple and rapid chemical tests were developed to resolve uncertainty in varietal identification in rice.

Variety identification has great significance especially for those involved in seed quality maintenance, seed production, breeding as well as intellectual property right point of view. The decrease in the morphological variation among the major rice varieties due to narrow genetic base makes it necessary for the development of quick and reliable tests for varietal identification. Nirmal seed's all ten varieties of rice viz. NR-48 (Parvati), NR-89 (Kranti), NR-1011, NR-628, NR-874, NR-348, NB 3 (Madhumati), NR-9 (Sairam), NR-212 (Sai), NR-241 (Vaishanavi) were tested for five different chemical tests viz., Phenol, Modified Phenol, FeSO₄, KOH and NaOH tests. Based on the colour reaction of different genotypes seed keys were developed for distinguishing the ten paddy varieties. All the five chemical tests grouped the varieties into two to four classes based on their reaction. Even though, not even a single test could identify any individual variety, but in conjunction the five chemical tests identified all the ten rice varieties individually. Thus these simple, reliable and quick tests can be used for varietal identification in rice crop.

NSPL's rice varieties got stabilized and occupied major rice growing areas of the country. Due to narrow genetic base and reduced range of variation among varieties chosen by the breeder & farming community because of the interest of consumers towards specific grain types (Short, Fine, Medium and long slender) of rice varieties, it is often becomes difficult to identify the varieties just by using morphological characteristics, & the time duration of one complete season for identification of



varieties using standard Grow-Out Test is one of the major constraints in its implementation. Hence several simple and rapid chemical tests were developed to resolve uncertainty in varietal identification in rice. The experiment was undertaken to develop seed keys for the identification of different rice varieties of NSPL using various simple and rapid chemical tests in conjunction.

MATERIALS AND METHODS

Nirmal seeds all ten varieties of rice viz. NR-48 (Parvati), NR-89 (Kranti), NR-1011, NR-628, NR-874, NR-348, NB-3 (Madhumati), NR-9 (Sairam), NR-212 (Sai), NR-241 (Vaishanavi) were used for the study. The nucleus seed of these ten varieties were taken. Five chemical tests viz. Phenol, Modified Phenol, Ferrous Sulphate, Potassium hydroxide and Sodium hydroxide tests were conducted on the rice seeds. Hundred seeds of each variety were observed visually for seed colour with the aid of magnifying glass.

A) The standard phenol test: Testing method suggested by Walls (1965), Two replicates of 100 seeds each were soaked in



distilled water for 18 hours. The seeds were then placed in Petri dishes containing filter paper moistened with 4 ml of 2 % phenol solution and kept at room temperature (28°C). After 24 hours, the seeds were examined for staining and grouped into strong (+++), moderate (++) and negative. (-) based on the colour intensity.

B) Modified phenol test: Test method suggested by Banerjee & Chandra (1977) the test was followed two replications of 100 seeds each were soaked in 0.5 % solution of copper sulfate under ambient conditions for 18 hours and then placed over a filter paper moistened with 4 ml of 29 % phenol solution. The colour reaction observation was made in the similar manner as described for phenol test.

Images of Modified phenol test



NR-89 Control

Strong Stain NR-89



NR-212 Control

Moderate Stain NR-212

C) Ferrous sulfate test (FeSO₄): The test described by Gupta & Agrawal (1987) the test was followed two replications of 100 seeds each were soaked in 1.5 % FeSO₄ solution for 24 h under ambient condition and later the seeds were taken out and the excess solution was removed using blotting paper before evaluation. The seeds were examined for colour reaction and grouped as Dark Grey Streaks (DGSt), Brown Streaks (BSt) and Brown Spots (BSp).

Images of FeSO₄ test



(NB-3) Control

Brown Streak (NB-3)



NR-9 Control

Dark grey streak NR-9



Control NR-348

Brown Spot NR-348

D) Potassium hydroxide test: Test described by Vanangamudi, K., V. Palanisamy & P. Natesan (1988), the test was followed two replications of 100 seeds each, seeds were soaked in 5% KOH solution and kept at room temperature (28°C) for three hours. The colour change of the KOH solution was observed and based on the colour reaction the varieties were divided into two groups viz., Deep wine red (+ve) and light wine red (-ve).



Color reaction with KOH

E) Sodium hydroxide test: Two replications of 100 seeds each were soaked in 5 % NaOH solution for one hour and the change in colour of the solution was observed. Based on the colour developed the varieties were classified into three groups viz., Dark Yellow (DY), Medium Yellow (MY) and Light Yellow (LY)



Color Developed with NaOH

RESULTS AND DISCUSSION:

The Phenol colour test, where phenol gets oxidized into dark colour melanin catalyzed by tyrosinase enzyme, is a simple, quick and accurate test for grouping of rice varieties. Based on phenol colour reaction all the ten varieties used in the study were grouped into two classes (Table 1). The equal number of varieties five showed moderate colour reaction & five varieties showed strong reaction towards phenol test. In view of the high heritability and stability, phenol test was used as primary diagnostic character for distinguishing paddy varieties. A close observation of the results indicate that even though this is a quick and stable test, it alone is not sufficient to identify all the varieties since it forms different groups based on their colour reaction. Therefore it is necessary to use various other chemical tests for distinguishing all the varieties.

The modified phenol test individually separates all the ten genotypes into three groups. In this investigation three varieties were grouped under strong reaction group, five into moderate group & two variety in no colour reaction group.

Table1. NSPL'S Rice varieties showing different colour reactions to chemical tests

NSPL'S Rice varieties showing different colour reactions to chemical tests.						
Sr.No.	Kind & Variety	Phenol Test	Modified Phenol Test	FeSO4 Test	KOH Test	NaOH Test
1	Paddy NR-48(Parvati)	++	+++	DGSt	+ve	DY
2	Paddy NR-89(Kranti)	++	+++	BSt.	+ve	MY
3	Paddy NR-1011	+++	++	BSt.	-ve	LY
4	Paddy NR-628	+++	++	DGSt	+ve	DY
5	Paddy NR-874	++	++	DGSt	+ve	DY
6	Paddy NR-348	++	(-)	BSp	-ve	LY
7	Paddy NB-3(Madhumati)	+++	+++	BSt.	+ve	DY
8	Paddy NR-9(Sairam)	++	(-)	DGSt	-ve	LY
9	Paddy NR-212(Sai)	+++	++	BSp	-ve	LY
10	Paddy NR-241(Vaishanavi)	+++	++	DGSt	-ve	LY



Abbreviations:

Staining:- Strong: +++; Moderate: ++; Negative: (-);
 DGSt: Dark grey streaks; BSSt: Brown streaks; BSp: Brown spots;
 Deep wine red (+Ve); Light wine red (-ve);
 DY: Dark yellow; MY: Medium yellow; LY: Light yellow.

Based on Ferrous sulfate test all the ten varieties were classified into three groups with five varieties showing dark grey streaks, three varieties showing brown streak and in two varieties observed brown spots. The ferrous sulfate test when used in combination with both phenol and modified phenol tests, could be able to distinguish ten different varieties altogether (Table. 1).

All the ten varieties were grouped into two distinct classes based on their colour reaction with KOH. Only five varieties developed deep wine red colour when treated with KOH solution (Table 1). Similarly three distinct groups, dark yellow (4 varieties), light yellow (5 varieties) and medium yellow (1 variety) were formed with the NaOH test. These two tests were greatly useful in resolving the groups formed by above three tests (Table. 1).

Thus the seed keys developed based on five chemical tests (Phenol, Modified Phenol, FeSO₄, KOH and NaOH tests) could clearly distinguish all the ten varieties from each other.

In conclusion, it was observed that individual chemical tests are of limited value, but when used in conjunction with each other can separate almost any number of rice varieties as was proven in this study that no single chemical test could distinguish even a single variety but when these tests were used in combination could identify all the ten varieties individually. Hence these simple, rapid and reliable tests are of immense value for the varietal identification purpose in rice crop.

REFERENCES

1. WALLS, W.E. (1965). A standardized phenol method for testing wheat seed for varietal purity.
2. BANERJEE, S.K. & R. CHANDRA (1977). Modified phenol test for varietal identification of wheat. Seed Sci. Technol.,
3. GUPTA, P.K. & R.K. AGRAWAL (1987). Determination of varietal purity of paddy varieties by laboratory evaluation. .
4. VANANGAMUDI, K., V. PALANISAMY & P. NATESAN (1988). Variety determination in rice phenol and potassium hydroxide tests. Seed Sci. Technology
5. AGRAWAL, P.K. & M. DADLANI (1987). Techniques in Seed Science and Technology, New Delhi.

◆ Wedding Bells



Chi. Umesh

S/o. Shri Ganesh Vamam Rajput
With

Chi. Sau. Kan. Shital

D/o. Shri Kailash Bhimsing Khirnar
On 16th April 2017

Chi. Rajendra

S/o. Shri Pralhad Gulabsing Patil
With

Chi. Sau. Kan. Sheetal

D/o. Shri Rajendra Bharatsingh Devre
On 17th April 2017

Chi. Sanket

S/o. Shri Prakash Dhanji Sable
With

Chi. Sau. Kan. Kalpna

D/o. Shri Sanjay Manikarao Patil
On 19th April 2017

Chi. Vinayak

S/o. Shri Hilal Omkar Bhagat
With

Chi. Sau. Kan. Madhuri

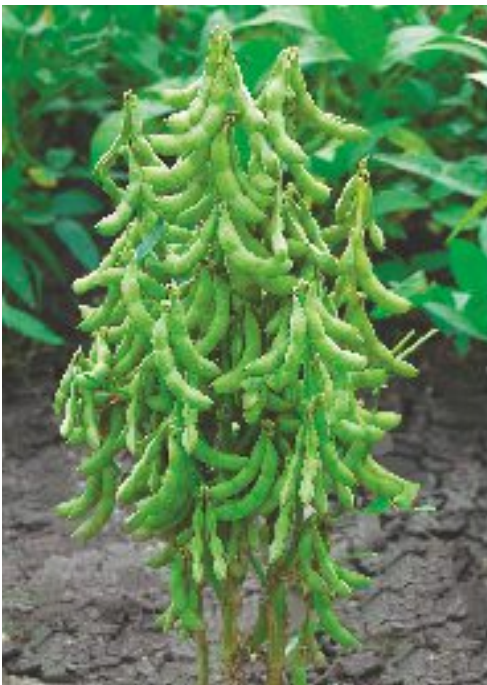
D/o. Shri Ishwar Kadulal Patil
On 19th May 2017

Chi. Valmik

S/o. Shri Madhavrao Patil
With

Chi. Sau. Kan. Madhuri

D/o. Shri Tolaji Gavhane
On 21st April 2017



Soybean Seed QUALITY

Deterioration: A Review

I. S. Halakude
(Research Coordinator)

The germination potential in Soybean is very short as compared to other oil seed. This is acute problem under tropical condition like india . Further, the soybean seed is highly susceptible to mechanical injury and damage occurring during post harvest handling, which affect the viability and vigour of soybean seed during storage. Besides these, large number of pathogens are also associated with soybean seed which lead to the reduction in germination and storability of the seed. However, the seed quality and viability during storage depend upon the initial quality of seed and the manner in which it is stored. The rapid seed deterioration of soybean is thought to be due to lipid peroxidation, subsequently resulting in loss of seed viability.

Soybean seed quality is affected during pre and post harvest periods. Soybean seed reaches its maximum potential for germination and vigour at physiological maturity. The germination potential (viability) is very short lived in soybean as compared to other oilseed crops and is often reduced prior to planting time. This loss of germination is much more acute under tropical conditions like India. These environmental conditions make very difficult to maintain its viability during storage. Further, the soybean seed is highly susceptible to mechanical injury and damage occurring during post harvest handling, which affect the viability and vigour of soybean seed during storage. Besides these, large number of pathogens are also associated with soybean seed which lead to the reduction in germination and storability of the seed. However, the seed quality and viability during storage depend upon the initial quality of seed and the manner in which it is stored. The rapid seed deterioration of soybean is thought to be due to lipid peroxidation, subsequently resulting in loss of seed viability.

• Deterioration of seed quality due to field weathering

The deterioration of seed quality, vigor and viability, due to high relative humidity and high temperature during the post-maturation and pre-harvest period is referred to as field weathering (Bhatia et al, 2010). Weathering not only lowers seed germination, but also increases susceptibility to mechanical damage and disease infection. Timely harvesting avoids prolonged exposure to moisture, and is the best means of avoiding weathering

• Deterioration of seed quality due to mechanical damage

Mechanical damage is one of the major causes of seed deterioration during storage, very dry seeds are prone to mechanical damage and injuries. Such damage may result in physical damage or fracturing of essential seed parts; broken seed coats permit early entry and easy access for mycoflora, make the seed vulnerable to fungal attack and reduce storage potential (Shelar, 2008).

• Deterioration of seed quality during storage

The variation in speed of seed deterioration of soybean varieties is a genetic character. Soybean genotypes differ in their ability to maintain seed longevity (Wine and Kueneman, 1981). The longevity of seeds in storage is influenced by four major factors viz.,

- i) Genetics,
- ii) Quality of the seed at the time of storage,
- iii) Moisture content of seed or ambient RH,
- iv) Temperature of storage environment

Shelar (2002) carried out research on soybean seed quality during storage and reported that the germination of soybean varieties decreased during storage irrespective of varieties, threshing and processing methods and storage containers. The germination of seed declined with the increase in the seed moisture and storage period. But the decline in germination of seeds showing damaged seed coat was very severe at room temperature. Gupta (1976) reported that soybean



seeds are short lived as compared to maize, rice, wheat etc. The seeds having only high initial germination (>80-90%) could be recommended for one season storage. Storing soybean seeds beyond first planting season at room temperature may not be successful even in moisture resistant containers. Upto second planting season soybean could be safely stored in cold storage (4-5°C temperature and 50-60 % RH). He stated that there is no report from India on storage of soybean seeds beyond second planting season. The optimum storage conditions were found to be at 25-30° C and 55-65 % RH. (Shelar, 2002).

● Effect of Moisture content

The moisture content of seed during storage is no doubt the most influential factor affecting the longevity. High seed moisture content is the most important single factor governing loss of germinability during storage. Seeds are hygroscopic. They absorb or lose moisture until the vapour pressure of seed moisture and atmospheric moisture reach equilibrium. The seed moisture content attained under these conditions is referred to as equilibrium moisture content (EMC). The EMC in seed at given RH decrease slowly with increasing temperature. The soybean seed imbibe high amount of water to create equilibrium inside and outside the seed. The hydrophilic nature of high protein content of soybean (Hartwig and Potts, 1987) helps in more absorption of water and high oil content in seed increases deterioration of seed (Potts, 1972) by increased hydrolytic enzyme activity, enhanced respiration and an increase in free fatty acids.

Guidelines to minimize soybean seed quality deterioration

► Harvesting

Soybean seed germination and vigour is high at physiological maturity. So that harvesting should be done at proper physiological maturity stage to avoid field weathering and next season germination constrains. The proper physiological maturity stage come when the pods, stem and leaves are turns yellow and the yellow leaves still attach to the plant. Avoid late harvesting i.e. in over dry stage. After harvesting keep it for sun drying upto 2-3 days.

► Threshing

There are different methods for soybean seed threshing. It can be done with the help of combine harvester, tractor, bullocks, threshers and beating by sticks. In case of combine harvester and

thresher, the possibility of mechanical injury increases. At the time of use of thresher, the drum speed should be adjusted at 400 RPM to avoid seed coat cracking and the moisture content of seed should be 16 to 17 per cent. When using tractors for soybean threshing, the layer should be 1.5 feet higher from the ground level.

► Processing

After the harvesting and threshing, the seed processing should be done as early as possible viz. in the month of December to January. During this stage, the moisture content in the seed is higher and it helps to minimize seed coat cracking during the processing.

► Storage

During storage, seed moisture content and temperature are responsible for seed deterioration, many physiological and biochemical changes occur in seeds during seed ageing. The seed quality and viability during storage depend upon the initial quality of seed and the manner in which it is stored. Use 400 gauge polythene bags for storage of seed and allow staking upto six bags per stake. For safe storage of seed, it should be free from fungi and pests and inert matter or waste material, which favour growth of storage fungi. Moisture content of stored seeds should be below 12 %, storage room temperature and relative humidity should not go beyond 30° C and 65 % RH, respectively.

References:

- Bhatia V S, Yadav S, Jumrani K and Guruprasad K N. (2010).** "Field deterioration of Soybean seed: Role of oxidative stress and antioxidant defense mechanism", *Jour. Plant Biol.*, Vol. 32, No. 2, pp. 179-190.
- Gupta, P.C. (1976).** *Seed Res.* 4(1): 32-39.
- Hartwig, E.E. and. Pottis, H.C. (1987).** *Crop. Sci.* 27 : 506-508.
- Justice, O.L. and Bass, L.N. (1979).** *Principals and Practices of Seed Storage.* Castle House Publication Ltd. London.
- Potts, H.C. (1972).** *Seed Techno.Lab. Bull. Mississippi State University.* Mississippi State, U.S.
- Shelar, V.R. (2002)** Ph D. Thesis MPKV, Rahuri (MS)
- Shelar V R, Shaikh R S and Nikam A S. (2008).** "Soybean seed quality during storage: A review", *Agric. Rev.*, Vol. 29, No. 2, pp. 125-131.
- Wine, H.C. and. Kueneman, E.A (1981).** *Field Crop Res.* 4 : 123-132.



Nirmal's New YVMV resistant and ELCV tolerant Okra hybrid NOH-1082

S.Y. Patil (Plant Breeder)

B. P. Jadhav (Sr. Scientist Veg.)

Ookra (*Ablemoschus esculentus* (L) Moench) is an annual, often cross pollinated vegetable crop belongs to Malvaceae family. It is warm season vegetable crop widely cultivated in tropical and subtropical regions of the world. It is commercially important vegetable widely grown in low to high input system for domestic and export markets. India is the largest producer of okra having 504 thousand hectare area and production of 5709 thousand MT, with productivity of 11.5 MT/ha (source-NHB-2015). In India major okra producing states are UP, Bihar, Orissa, West Bengal, AP, KN and Maharashtra.

Okra is well known for its nutritive value because of its vitamin and mineral contents. Okra has many medicinal uses. It is powerhouse of nutrients including soluble fiber in the form of pectin and gum which reduces the cholesterol and lowers the risk of heart diseases. Tuberos roots of some wild okra are used to overcome impotency in human beings by tribal people of India. (chopra, et. al, 1986). Okra possess desirable alkaline pH which helps in relieving effect in gastrointestinal ulcer by neutralizing digestive acid (Wamanda, 2007). Okra mucilage is effective as blood volume expander and has potential to cure renal diseases (Siemonsma and koume, 2004). The okra has many application in fiber, paper, artificial wood industries and jaggery preparations.

The crop is prone to damage by various insects, fungi, nematodes and viruses. Its cultivation in India is challenged by severe incidence of viral diseases, viz. Yellow Vein Mosaic Virus (YVMV) disease and Okra Enation Leaf Curl Virus (OELCV) disease, spread by an insect vector, namely whitefly (*Bemisia tabaci* Gen).

What is Okra Yellow Vein Mosaic Virus? (YVMV)

The YVMV disease is characterized by a homogenous interwoven network of yellow vein enclosing islands of green tissues within the leaf. In extreme cases, infected leaves become completely yellowish or creamy. If plants are infected within 20 days after germination, their growth is retarded with few leaves and malformed fruits resulting in loss ranging from 94% to 100%. The extent of damage declines with delay in infection of the plants. A loss of 49–84% has been reported when infection occurred after 50–65 days of germination.



Symptoms of Yellow vein mosaic Virus

What is Okra Enation leaf curl Virus? (OELCV)

Okra Enation Leaf Curl Virus (OELCV) disease is serious in North India. Initial symptoms of this disease include small, pin-headed enations on leaves, leaf curling, followed by warty and rough texture of the leaves. The undersurface of the leaves is characterized by mild, bold and prominent enations. There is twisting of main stem, lateral branches and leaf petiole. The leaves become thick and leathery. Leaf curling and enations are more prominent in middle-aged leaves. In severe cases, there are enations, leaf thickening and curling even in the young leaves. At times, the twisting and bending of the stem are so severe that the entire plant seems spreading on the soil surface. The infected plants either do not produce fruits or produce few deformed and small fruits unfit for marketing and consumption. The yield loss varies from 30% to 100% depending upon the age of the plant at the time of infection.





Symptoms of Enation leaf curl Virus

Nirmal's Contribution

Keeping in mind the above problems, Nirmal's scientists screened all germplasm at hotspot repeatedly for three years and developed the hybrid having resistant to yellow vein mosaic virus (YVMV) and highly tolerant to enation leaf curl virus (OELCV).



OKRA HYBRID NOH-1082

- ▶ Very early fruiting with close internode distance
- ▶ Dark green tender 12-14 cm long, straight, Pentagonal fruits
- ▶ Excellent taste and keeping quality
- ▶ Highly tolerant to YVMV & ELCV diseases
- ▶ High yielding hybrid
- ▶ Suitable for round the year cultivation in okra growing area.



OELCV Susceptible Check

YVMV Susceptible Check



Nirmal's new CMV tolerant Ridge gourd hybrid NRGH-726

Mukesh B. Patil (Plant Breeder)

B. P. Jadhav (Sr. Scientist Veg.)

Considering the practical problems of virus disease management, it is therefore important to identify virus resistant or tolerant hybrids to achieve higher yields. Nirmal Seeds has developed new ridge gourd hybrid NRGH-726 having good tolerance to CMV, DM and PM diseases.

Ridge gourd [(*Luffa acutangula* (Roxb.) L.) is an important cucurbitaceous vegetable of commercial importance in India. It is grown commercially as a summer and rainy season crop. The fruits of ridge gourd are delicious and possess good medicinal properties. The edible portion of fruit contains protein, fat, minerals, fiber, carbohydrate, vitamin-A, thiamine, riboflavin, nicotinic acid, vitamin C and oxalic acid. It is commonly used for vegetable and fiber extraction. Seed of ridge gourd contains 18.3 to 24.3% oil and 18 to 25% protein. The cultivated varieties of ridge gourd are monoecious in nature and different sex forms viz., androecious, gynoeceous, gynomonoecious, andromonoecious and hermaphrodite plants are also reported.

It is an important Spring- Summer and rainy season vegetable crop of the North Indian plains and it is an all-year-round crop of the South Indian plains. In India, majority of high yielding and locally adapted ridge gourd hybrids and varieties were found susceptible to Cucumber mosaic virus (CMV) disease which leads to low production and more economic losses. The crop also affected by Downy mildew, Powdery mildew diseases. Considering the practical problems of virus disease management, it is therefore important to identify virus resistant or tolerant hybrids to achieve higher yields. NSPL developed new ridge gourd hybrid NRGH-726 having good tolerance to CMV, DM and PM diseases.

NRGH-726 :

- Dark green, straight, 30-35 cm long attractive fruits.
- Hybrid ready for first harvest from 50-55 days after sowing.
- Excellent keeping quality and taste.



NRGH-726

- Tolerant to DM, PM and CMV diseases.
- Wider adaptability and good fruit setting in high temperature.



Rising Temperature : Challenge before the crop breeding

Milind P. Kulkarni
(Sr. Scientist Cereal Crops)

The average temperatures in India raised by more than 0.5° C between 1960 and 2009. There has been an increase in heat waves from 2013-2016 and a decrease in cold waves. This is because of the increase in global temperature. The year 2016 has been the warmest year in India, last year in May, India witnessed a record 52.4° C in the western city of Jaisalmer. Most in India rely on agriculture for their livelihoods, and climate change is likely to damage their crops.

According to the study, the annual mean temperature in India has increased by 1.2 degrees Celsius since the beginning of the 20th century. In fact, 2016 was the second warmest year on record with temperature of 1.26 degrees Celsius higher than its previous years. Moreover, the winter of January-February in 2017 was hottest in recorded history with temperature of 2.95 degrees Celsius higher than the baseline.

Thirteen out of the 15 warmest years were during the past 15 years (2002-2016). The last decade (2001-2010/ 2007-2016) was also the warmest on record.

Annual mean temperature in India has rapidly increased since 1995. At this rate of increase, it will breach the 1.5 degrees Celsius mark within the next two decades. Winters and pre- monsoon (summers) and post-monsoon seasons have seen rapidly increasing warming. Mean temperature during winter months is now over 2 degrees Celsius warmer than in the beginning of the 20th century.

In the winter of 2016-17, the mean temperature was 2.95 degrees Celsius higher than the 1901-1930 baseline--the warmest in recorded history. It is only during the monsoon months that the temperature increase is about 1 degrees Celsius.

Most of the crop plants gets affected due to rise in temperature even by a fraction of degrees Celsius. It directly or indirectly affect the germination, emergence, growth and development of economical traits like flowering, fruit setting, grain setting, fruit quality, disease pressure (some vegetable crops by increasing vector population) ultimately the yield and quality of the agricultural produce.

It is now prerequisite to give the emphasis on breeding for high temperature and the drought tolerance. Relative humidity also plays a vital role in the temperature rising situations. The low humidity coupled with high temperature drastically affects the agricultural yield. Now it is most important to have the strong breeding programme in different crops having the high degree tolerance or resistance against the rising temperature conditions.



Source : <http://www.oneindia.com>

Nirmal Seeds have already given the emphasis on this aspect in the breeding in different crops like Pearl millet, Wheat, Maize, Sorghum, Chilli, Tomato, Okra and Cucurbits. The crop trials are conducted at the hot spots identified for such evaluation. As a result of the evaluation, different hybrids and varieties are promoted for the commercial production.

In Pearl millet, the cultivation of pearl millet during the summer is increasing due to its short duration and selected as a catch crop, which gives higher yields and returns. Pearl millet is also an important fodder crop in the summer season, as most of the other crops cannot withstand hot temperatures. The hybrid NPH-4915 (Yashwant) and another new hybrid NPH-5423 found to be highly tolerant to the increasing temperature conditions with good fodder yield. These hybrids are becoming popular among the farming community in the pearl millet growing areas.

Wheat crop is more sensitive for the temperature fluctuations. Every rise in the degree Celsius temperature directly affect the germination, productive tillering, spike length, seed setting and most important the seed quality. It is therefore to have the variety, tolerant to temperature fluctuations which can withstand and give the quality grain produce. The short duration variety will copeup the rising temperature conditions to get the required heatunits for the vegetative and reproductive growth stages. Nirmal Seeds have developed a short duration wheat variety NW-139 having duration of 100-105 days, good grain quality and chapati quality. It is also tolerant to the rust disease. It will perfectly suit the rising temperature scenario.



Post harvest techniques for high quality seed in maize

A. B. Birajdar
(Plant Breeder)

HARVESTING

- Harvesting should be done at proper stage. It should be done after husk turn yellow.
- Harvesting should start when ear starts bending towards the ground level.
- Male parent should be harvested first then female parent.
- The harvested cob should be spread in bright sun light for 8-10 days instead of making heap.
- Remove top portion from upper side of ear after flowering which leads to bold & healthy seed set & early maturity upto 3-5 days.
- Seed moisture at harvesting up to 18-20 % during sun drying.
- Seed moisture at threshing near 13-15 % during sun drying.
- Mechanical damage at the time of threshing if cylinder speed is too high. So, moderate speed should be kept.
- The sun dried seeds are not suitable for long term storage due to uneven drying. Force hot air drying is good.

Cobs are stored after removal of husk for Sun drying



Seed moisture (During harvesting) : around 18%
Seed moisture (During threshing) : around 14%

Sun Drying

Reasons for poor germination

Early harvesting i.e. physiological maturity (black layering) at this state grain moisture contains 31-33% moisture. Harvesting grain at moisture content 31-33% result in significant damage to grain & make it more difficult to germinate. High quality grain may require harvest moisture to be around 18%.

Care to be taken during harvesting

Proper stage of harvesting



Immature cob



Artificial Drying

- The most common artificial drying method is to force hot air through the cob's, to evaporate & remove the excess moisture from the seed.
- The cob harvested at a grain moisture content of 25-30% & transferred to a drier to bring moisture level upto 10-12.5%.
- Best method to obtain good vigour & germination.
- Risk of seed damage & poor germination negligible.
- Due to uniform drying damage during shelling is less.
- Chances of seed quality deterioration in storage are minimum.

Storage

- Seeds at 15% moisture can be stored for one season, at 10-12% for 3 seasons & 8-10% for long term storage at below 10° C.
- Seed equilibrium moisture remained below 11.5% is for good germination & viability.
- If storage facility is not available then reduce seed moisture upto 8% & it should be kept in airtight jute bag & should be kept in cool and dry place.
- Storing in air tight containers reduces stored pests & diseases infestation.
- The principal objective i.e. seed storage is to maintain seed quality & life of seed.
- Seed moisture content & temperature are two most important factors influencing seed storage ability. Seed biological activity increases as moisture & temperature. increases. storage insects are increased under higher moisture & temperature conditions. Both temp. & moisture strongly interact to affect seed quality.
- 50% RH & 10° C temperature or 60% RH & 5° C temp. would be most suitable to maintain maize seed quality for a period of one year or more.
- Storage at less than - 20° C is recommended for long term storage.
- As a rule of thumb that for every 1% reduction in seed moisture content, the life of the seed is doubles.
- Application of potassium carbonate @ 4gm/kg & propionic acid @ 4ml/kg increase the germination upto 5-10%.



Desi Cotton Hybrid NACH-433: Identified for Central Zone of India for Notification.

Dr. S. A. Patil
(Plant Breeder)

Nirmal seeds has developed a desi cotton hybrid NACH-433. It has high seed cotton yield potential with big boll size, short staple length and excellent boll bursting. It was tested in All India Coordinated Cotton Improvement Project since last four consecutive years (2013 to 2016) and it performed well and ranked top with respect to high seed cotton yield during testing years in Central zone of India



Boll picture of Deshi Cotton Hybrid NACH-433

Cotton (*Gossypium hirsutum* L.) is an important commercial crop of India grown for its lint used as a major textile fibre, which is aptly called as “White Gold”. It is contributing upto 85 per cent of raw material to the textile industry. India, having approximate 10.5 million hectare cultivated area which is largest in the world. India rank first in terms of production about 27.0 millions bales of 480 lb in world cotton production. Presently, Indian farmers are cultivating both upland (*G. hirsutum*) and barely deshi cotton hybrid (*G. arboreum*). But after introduction of Bt, the *G. hirsutum* cotton area was more as compared to desi cotton. Presently the desi cotton hybrids/varieties grown under negligible area in some Parts of India. The Desi cotton survived vagaries of nature for millions of years in India and have thus evolved to tolerate and resist a wide range of diseases, insect pests, drought, water-logging, salinity, and many adverse environment conditions.

The Desi cotton was immune to many diseases including the dreaded cotton leaf curl virus. They grow well in marginal soils and sub-optimal regions. The two Indian Desi species (*G. arboreum* and *G. herbaceum*) are so sturdy and robust that they acclimatize fast and grow easily in adverse conditions too. The Desi species are good yielders and require least chemical inputs such as fertilizers and pesticides to obtain similar or better yields as compared to the American cotton. Desi cotton for spinnable and non-spinnable fibres. Two categories of Desi cotton varieties/hybrids can make a huge difference especially in the rain-fed tracts that comprise 60% of the cotton area of India. One type is the short and coarse fibre

(non- spinnable fibre) varieties/hybrids that are suitable for absorbent cotton, surgical, denims, mattresses, technical textiles etc., whose demand is growing and the market price is very high. Other category pertains to Desi varieties that produce good quality spinnable fibres having long staple with medium fine fibre. There are some newly improved varieties with very good fibre traits that are equivalent to American cotton varieties.

After putting hard endeavor from last many years, Nirmal seeds has developed a desi cotton hybrid NACH-433 (Nirmal-433). The hybrid NACH-433 has high seed cotton yield potential with big boll size (3.5-4.0 gm), short staple length (20.00 mm) and excellent boll bursting. This hybrid was tested in All India Coordinated Cotton Improvement Project since last four consecutive years (2013 to 2016) and it performed well and ranked top with respect to high seed cotton yield during testing years in Central zone of India as compared to zonal and local checks.

Therefore, the hybrid NACH-433 has been identified and released for Central zone of India (Maharashtra, Gujarat and Madhya Pradesh) under rainfed condition by Central Variety Identification Committee during AICCIP annual group meet held at TNAU, Coimbatore (Tamil Nadu) during 8th - 10th, April 2017 for notification. The hybrid NACH-433 is having short staple length (20.6 mm) and high micronaire value (above 7.0) with non- spinnable fibre, which may be useful as a absorbant cotton. This hybrid has ability to tolerate against sucking pest (Jassids) and tolerant to boll worm and drought condition.



Field View of Desi Cotton Hybrid NACH-433

Despite of this all, NACH-433 has wider acceptability on farmers fields of various states of India especially Maharashtra, Gujrat and Madya pradesh etc. with an average yield ranging from 14 to 16 qt/acre and fetch comparatively more price (i.e. Rs.500 to 800 per quintal) than Bt hirsutum cotton. Considering all the views and feedbacks from farmers of various states, the hybrid NACH-433 emerged as good source for scanty resources of poor farmers because of it's least input cost. This hybrid is also suitable for sustainable cultivation in organic cotton farming as a non- spinnable fibre.



Plant View



Excellent boll bursting

NACH-433

Characteristics

- Growth habit :- Tall, open, medium spreading
- Duration :- Medium
- Boll size and shape:- Big, Round oblong
- Avg. Boll Weight (gm):- 3.5-4.0
- Staple length (mm):- 20-21
- Fibre Strength (g/tex):- 19-20
- Micronaire ($\mu\text{g}/\text{inch}$):- Above 7.0
- Uniformity Index:- 77
- Elongation (%):- 6.9
- Ginning Outturn (%):- 39-40

Special Features

- Big boll size with excellent bursting
- Excellent locule retention
- Short coarse staple
- Resistant to sucking pest
- Suitable for irrigated and rainfed cultivations
- Recommended topping of main shoot and monopodia at 4 to 4.5 feet height
- Suitable for central zone of India

बियाण्याची साठवण करतांना....

एम.एस.अलोने

(एरीया मॅनेजर – गुणवत्ता विभाग)

शाश्वत शेतीसाठीचे मुलभूत व सर्वात मोठी निविष्टा म्हणजे बियाणे होय. जागतीकीकरणाच्या युगामध्ये अलीकडच्या काळात उत्कृष्ट व दर्जेदार गुणवत्तापूर्ण बियाण्याला प्रचंड मागणी आहे आणि त्याचा फायदा भारतीय कृषी क्षेत्राला होत असतो. म्हणूनच बीज हा शेतीचा मुलाधार आहे. संपूर्ण शेती क्षेत्राची मदार ज्या बियाण्यावर आहे त्या बियाण्याची काळजी घेणे किंवा जपणे ही काळाची गरज आहे. बियाणे म्हणून विचार करतांना प्रत्येक दाणा महत्वाचा असतो. म्हणून त्याच्या अयोग्य पद्धतीच्या साठवणुकीमुळे किंवा दुर्लक्षामुळे होणारे नुकसान हे मोठे आहे. त्यामुळे बियाण्यांच्या साठवणी बाबत योग्य ती काळजी घेवून त्यांची शास्त्रोक्त पद्धतीने साठवणूक करणे आणि त्यावर औषणांची फवारणी, किटकनाशके आणि धुरीकरण यांचा वापर करणे गरजेचे आहे. त्यामुळे किडी, उंदीर, किटक यांच्यापासून संरक्षण केले जावू शकते.

धुरीकरण (फ्युमिगेशन):- धुरीकरणामध्ये धुरीजन्य किटकनाशकांचा वापर केला जातो. ही किटकाशके विषारी वायु तयार करतात. सर्व किटकनाशकांचा धुरीकरणाचा अवधी हा सारखा नसून तो वेगवेगळा आहे. अॅल्युमिनीयम फॉस्फाईड, इथिलीन डायक्लोराईड, कार्बन टेट्राक्लोराईड, इथिलीन डायब्रोमाईड या किटकनाशकांचा उपयोग धुरीकरणासाठी केला जातो. या सर्व किटकनाशकांचा धुरीकरणाचा अवधी सारखा नाही. जसे की अॅल्युमिनीयम फॉस्फाईड यामध्ये धुरीकरणाचा अवधी ७ दिवसांचा आहे. इथिलीन डायक्लोराईड अधिक कार्बन टेट्राक्लोराईडचा धुरीकरण अवधी ४ दिवस तर इथिलीन डायब्रोमाईडसाठी धुरीकरणाचा अवधी ४ दिवस आहे.

धुरीकरण (फ्युमिगेशन) करण्यापूर्वी महत्वाच्या गोष्टी पाळा :-

१) सर्वप्रथम गोदाम स्वच्छ ठेवा २) गोदामामध्ये बियाणे पोत्यांची योग्य साठवणूक करा. भिंतीला न लावता चारही बाजूने ३ फुट जागा सोडून पोत्यांची थप्पी लावावी. ३) बियाण्याची आर्द्रता १५% पेक्षा कमी व वातावरणातील आर्द्रता ५०% पेक्षा कमी असेल तर फ्युमिगेशन करू नये. त्यामुळे टॅब्लेटची तीव्रता कमी होते. धुरीकरण बरोबर होत नाही. बियाण्याची आर्द्रता जास्त असेल तर धुरीकरण (फ्युमिगेशन) करून बियाणे उन्हात टाकावे.

- जमिनीला भेगा नको किंवा खालील बाजूस असलेल्या फरशीला खाचा नको अशा भेगांमध्ये किडीच्या अवस्था राहण्याची शक्यता अधिक असते. खाचामध्ये किडी बऱ्याच दिवसापर्यंत सुप्तावस्थेत राहू शकतात.
- फ्युमिगेशन कव्हरला छिद्रे असू नये. असल्यास ते काळा किंवा निळा स्टिलग्रिप टप लावून हवाबंद करावे. ब्राऊन टप वापरू नये.
- केवळ १५ मिनीटात गॅस निघणे सुरु होत असल्यामुळे अगोदर म्हणजेच धुरीकरणापूर्वी वाळूने भरलेल्या पोती (सॅन्ड स्नेक) बियाण्याच्या पोत्यांच्या थप्पी जवळ आणून ठेवाव्यात.
- धुरीकरणासाठी अॅल्युमिनीयम फॉस्फाईड या किटक नाशकाचा आवश्यकते नुसार वापर करावा. सर्वसाधारणपणे एक मेट्रीक टन (१० क्विंटल) बियाण्यासाठी ३ टॅब्लेट (९ ग्रॅम) वापरावे. यातून ३ ग्रॅम फॉस्फीन गॅस निघतो.
- टॅब्लेट कापडी पिशवीतून टाकून देणे. उदा. १०० टॅब्लेट वापरायच्या असतील

तर ६० टॅब्लेट वरच्या बाजुला आणि ४० टॅब्लेट खालच्या बाजुला जमिनीपासून ३ फुट उंच टाकावेत. गॅस वजनाने जड असल्यामुळे तो नेहमी वरून खाली येतो. टॅब्लेट मधून पूर्ण गॅस बाहेर निघण्यास ४८ तास लागतात. (२५° से. तापमान असेल तर) धुरीकरण संपल्यानंतर पावडर पाण्यात डिसपोज करावी. आणि पाणी जमिनीत सोडावे. कापडी पिशव्या परत वापरू शकता.

- फ्युमिगेशन कव्हर उत्कृष्ट दर्जाची असावी. २०० जीएसएम (१X१ मिटर आणि वजन २०० ग्रॅम) क्रॉस लॅमिनेश कव्हर वापरावे. साधा पेपर वापरू नये.
- फ्युमिगेशन कव्हरवर बुट घालून चालू नये. त्यामुळे छिद्र पडण्याची शक्यता असते.
- तेलवर्गीय बिया उदा.मोहरी, सुर्यफुल, सोयाबीन, तीळ, करडई आणि भुईमुंग या पिकांना धुरीकरण करू नये.
- धुरीकरण करतांना चेहऱ्यावर फेस मास्क लावावा. फ्युमिनेशन करतेवेळी दोन माणसे असणे आवश्यक आहे. पोत्यांच्या थप्पीच्या शेजारी प्रथम रासायनिक किटकनाशक फवारणी (डायक्लोरोव्हास २ मिली किंवा डेल्टामेथ्रीन २ ग्रॅम प्रति लिटर) करावी. रबर बुटामुळे फॉस्फिन गॅस चा त्रास होत असल्यामुळे लेदरचा बुट वापरावा. डब्याचे वजन १ किलो असून त्यामध्ये ३३३ टॅब्लेट असतात. हातमोजे घालून डबा हळूहळू खोलावा. कारण डब्यामध्ये काही प्रमाणात हवा असते. त्यामुळे त्यात फॉस्फिन गॅस असतो. या गॅसमुळे ऑक्सिजन वायु निकामी होतो.
- हवाबंद असलेली प्लॅस्टिकची पिशवी किंवा बाहेरील पिशवी (आऊटर बॅग/ एच.डी.पी.बॅग.इ.) ला आतून प्लास्टिक असेल तर फ्युमिगेशन करू नये.
- नेहमी नेहमी फ्युमिगेशन करून नये. कमीत कमी ४५ दिवसानंतरच फ्युमिनेशन करावे.
- कच्चे बियाणे आल्याबरोबर फ्युमिगेशन करू शकता. त्यामुळे गोडावून मधील इतर चांगला माल खराब होणार नाही.
- फ्युमिगेशन झाल्यानंतर सदरच्या थप्पीला तसे पत्रक लावावे. त्यामध्ये पिक वाण, बियाण्याचे वजन, अॅल्युमिनीयम फॉस्फाईड ची मात्रा, धुरीकरण केल्याची तारीख व धुरीकरण कव्हर उघडण्याची तारीख यांचा आवर्जून उल्लेख असावा.
- अॅल्युमिनीयम फॉस्फाईडचा धुरीकरणाचा अवधी ७ दिवसांचा असल्यामुळे ७ दिवसानंतर थप्पीवरील कव्हर काढून टाकावे.

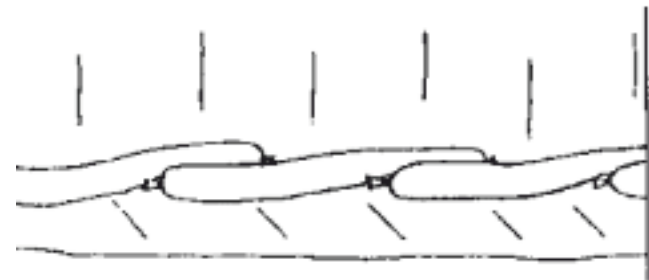
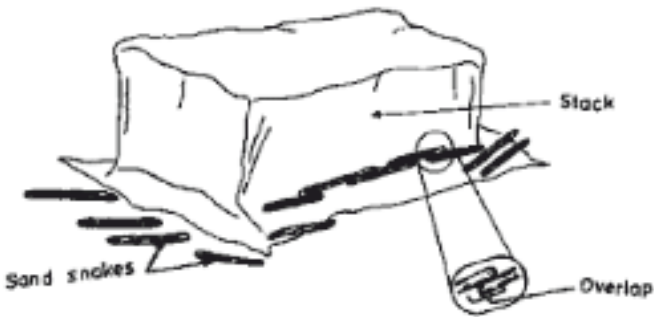




उंदरांपासून संरक्षण :- उंदीर या किडीचे एकूण १६०० प्रकार आहेत त्यापैकी भारतात १३० प्रकारचे उंदीर आढळून आले आहेत. उंदरामुळे अन्नधान्याची फार मोठ्या प्रमाणात नासाडी होते. एक उंदीर त्याच्या वजनाच्या १०% धान्य प्रति दिवस खातो. बियाणे उद्योगामध्ये ३ ते ४ टक्के बियाण्याचे नुकसान उंदरामुळे होते. हे टाळण्यासाठी उंदरांना प्रतिबंध करणे अतिशय गरजेचे आहे.

उपाय :-

- १) झिंक फॉस्फाईड टॅबलेट उंदीर येण्याच्या मार्गावर ठेवावे.
- २) प्रति गोडावून ५ ठिकाणी उंदीर पकडण्याचे पिंजरे लावावे
- ३) गोदामातील सर्व बिखं शोधून त्यात झिंक फॉस्फाईडच्या गोळ्या (टॅबलेट) पीव्हीसी पाईपच्या सहाय्याने १ फुट लांब बिळामध्ये जाईल अशा रीतीने टाकून सर्व बिळं हवाबंद करावे. नंतर तिन दिवसांनी त्याच बिळाची पुनर्तपासनी करून ज्या बिळाशेजारी माती काढलेली दिसते तिथे उंदीर जीवंत आहे असे समजून परत तिच क्रिया करावी.
- ४) पिंजरा, ग्लु पॅड लावून उपद्रव टाळावा.
- ५) गोडावूनला लागून कुठलेही झाड नको. कारण झाडाचा आधार घेवून उंदीर गोडावून मध्ये प्रवेश करतो.
- ६) उंदीर ३ फुट उंच उडी मारतो. कंपाऊंड भिंत कमीत कमी ४ फुट उंच असावी.
- ७) गोडावूनच्या तळाला बिळं चेक करणे व ते हवा बंद करावे.
- ८) झिंक फॉस्फाईड टॅबलेट गोडावूनच्या बाहेर टाकणे किंवा झिंक फॉस्फाईड ऐवजी ब्रोमोडिओलोन औषध वापरण्यास हरकत नाही.



साप :-

- १) सापापासून बियाण्याचे जरी काही नुकसान होत नसेल तरी सुद्धा गोडावून मध्ये उंदीराचा उपद्रव असेल तरच साप गोडावूनमध्ये प्रवेश करतो.
- २) गोडावूनमध्ये साप आहे ही खात्री असेल तर गोडावून मध्ये प्रवेश करू नये.
- ३) गोडावून मध्ये साप दिसला तर प्रथम तो नेमक्या कोणत्या दिशेला जात आहे त्याची खात्री करा नंतर आपण विरुद्ध बाजुला निघून जावे.
- ४) आपण जर घाबरून गेलो तर साप ज्या दिशेला जातो त्याच दिशेला आपण प्रवेश केल्यास धोका होण्याची शक्यता असते.
- ५) गोडावूनमध्ये प्रवेश करण्यापूर्वी आपल्या पायात गमबुट (वायरमन लोक वापरतात तो) तसेच सोबत टॉर्च घेवूनच जावे.
- ६) साप चावल्यास ढोपराच्या वर किंवा पायाच्या गुडघ्यांच्या वर घट्ट पट्टी / दोरी / करदोडा त्वरीत बांधावा कारण ढोपराच्या खाली तसेच गुडघ्यांच्या खाली मनुष्याला दोन हाडे असतात त्यामुळे तेथे घट्ट बांधून सुद्धा उपयोग नाही.
- ७) जंतर आणि मंतर करीत बसू नका. त्याला त्वरीत दावाखान्यात पोहच करावे. हल्ली सापाच्या विषावर हिमोटॉक्सिक अँनम, निरोटॉक्सिक अँनम प्रकारचे औषध उपलब्ध आहे.
- ८) साप एका ठिकाणी राहू शकत नाही. बाहेर तापमान वाढल्यास तो घरात किंवा गोडावूनमध्ये प्रवेश करतो.
- ९) गटारचे पाईप, इलेक्ट्रिक पाईप, इतर गोडावूनचे बिळ बंद करावे. कारण तो बिळ करीत नाही. तो आयत्या बिळाचा नागोबा असतो. गोडावून मध्ये इलेक्ट्रिक वायरिंग तार असेल तर संपर्क तोडावा. पीव्हीसी पाईप, सांडपाणी चे पाईप मधुन ते आत प्रवेश करतात. ते टाळावे. गोडावून शेजारी जे बीळ असेल, कंपाऊंड शेजारी बिळ असेल, गार्डन, लॉन्स मधील बिळ हवाबंद करावे.





New Research Products for MARKET

Sound research backup is a key success of Nirmal Seeds. The theme of research and development is to mainly focus on need base & research. Research is a continuous process and during the year 2016-17, the R&D division has made significant contribution in development to meet the challenges of climate change and to overcome the biotic and abiotic stresses. During the year 2016-17 total 21 new hybrids and varieties are identified and released.

Deshi (Arboreum) Cotton



NACH-556

Special features

- ▶ Big boll size and excellent boll bursting
- ▶ Medium long coarse staple
- ▶ Suitable for irrigated and rainfed cultivation
- ▶ Recommended topping of main shoot and monopodia at 4 to 4.5 feet height
- ▶ Suitable for Central and South zones of India

Wheat



NW-816

Special features

- ▶ Midlate maturity
- ▶ Medium bold, Shiny grains
- ▶ Excellent chapati quality and taste
- ▶ Highly tolerant to rust disease
- ▶ Recommended for North India

Hy. Maize



NMH-4530

Special features

- ▶ Full maturity with semi erect plant type
- ▶ Semiflint, medium orange bold grains
- ▶ Highly tolerant to TLB disease and stem borer
- ▶ Good tip filling with uniform cob size
- ▶ Suitable for kharif, rabi and early summer cultivation

Wheat



NW-139

Special features

- ▶ Very early maturity.
- ▶ Medium bold shiny grains
- ▶ Highly tolerant to rust diseases
- ▶ Suitable for timely & late cultivation

Mustard

NYM-283 (Yellow sarson)

Special features

- ▶ Midlate maturity with dwarf plant type
- ▶ Very long tetra-locular drooping silique
- ▶ Tolerant to white rust and powdery mildew diseases
- ▶ Recommended for only yellow sarson growing states



Paddy



NR - 348

Special features

- ▶ Medium slender non scented grains.
- ▶ Blackish colour of panicle at the time of flowering & golden colour of grains at the maturity
- ▶ High grain setting percentage with more no. of spikelets per panicle

- ▶ Excellent cooking quality & taste
- ▶ Highly tolerant to leaf blast, brown spot disease & gall midge fly
- ▶ Non lodging culm attitude
- ▶ Suitable for lowland cultivation



Mustard



NML-151

Special features

- ▶ Tall and midlate maturity
- ▶ Very long main shoot length with high silique density
- ▶ Very long silique length with appressed silique angle
- ▶ Tolerant to white rust and sclerotinia rot diseases

Black gram



Vikas (NUL-242)

Special features

- ▶ Early and determinate plant type
- ▶ Non shattering and synchronous maturity
- ▶ Highly tolerant to yellow mosaic virus and powdery mildew disease
- ▶ Suitable for Kharif, rabi and summer season cultivation as per
- ▶ SAU recommendations



Brinjal Hybrid

NBH-1772

Special features

- ▶ Mid tall, erect plant growth habit
- ▶ Attractive black coloured long fruits with purplish calyx
- ▶ Cluster bearing and good yield potential
- ▶ Very good keeping quality and shelflife



Okra Hybrid

NOH-1082

Special features

- ▶ Early fruiting with close internode distance
- ▶ Dark green tender, long, straight, pentagonal fruits
- ▶ Highly tolerant to YVMV & ELCV diseases
- ▶ Suitable for round the year cultivation except frost



Brinjal Hybrid

NBH-1698

Special features

- ▶ Very strong, semi erect plants with vigorous growth habit
- ▶ Medium big round fruit with non spiny plant, leaves and fruit calyx
- ▶ Green with white shaded fruits having long pedicel
- ▶ Uniform attractive fruits with good calyx cover & less seed content
- ▶ Continued fruiting period
- ▶ Good organoleptic taste with good shelf life



Chilli hybrid

NCH-1901

Special features

- ▶ Tall, erect sturdy plant type
- ▶ Attractive shiny green fruit colour
- ▶ Very compact, deep red coloured fruits with good red colour retention and high pungency
- ▶ Suitable for both green and dry red chilli purpose



Hybrid Chilli NCH-3590

Special Features

- ▶ Semi spreading, sturdy plant type
- ▶ Profuse branching and cluster bearing ability
- ▶ Shiny green, semi wrinkled fruit surface with high pungency
- ▶ Deep red coloured fruits with good red colour retention
- ▶ Suitable for both green and dry chilli purpose



Hybrid Tomato NTH-2383

Special features

- ▶ Semi-indeterminate vigorous growth habit with excellent reflushing ability
- ▶ Attractive deep red colour fruits with profuse fruit bearing ability
- ▶ Very good uniform fruits over the harvests
- ▶ Very firm fruits with excellent shelf life and good transport ability
- ▶ Highly tolerant to TyLCV, early and late blight diseases
- ▶ Suitable for Rainy and Winter season cultivation



Hybrid Ridge gourd NRGH - 726

Special features

- ▶ Dark green, straight, long attractive tender fruits
- ▶ Hybrid ready for first harvest from 50-55 days after sowing
- ▶ Excellent keeping quality and taste
- ▶ Tolerant to PM, DM and CMV diseases
- ▶ Wider adaptability & good fruit setting in high temperature



Hybrid Bitter gourd NBGH-1067 (Dolly)

Special features

- ▶ Shiny green, medium sharp prickled, thick long attractive fruits
- ▶ Wider adaptability with prolific fruit bearing ability
- ▶ Hybrid ready for first harvest within 55-60 days after sowing
- ▶ Excellent keeping quality and suitable for long distance market
- ▶ Tolerant to DM, PM and CMV diseases



Hybrid Cucumber NCH-527

Special features

- ▶ Uniform cylindrical, greenish white fruits
- ▶ Very attractive, crispy tender fruits
- ▶ Gynoecious base hybrid with prolific fruit bearing
- ▶ Tolerant to fusarium wilt, PM and CMV diseases
- ▶ Not suitable for winter cultivation



Clusterbean Variety (OP) NCB-115

Special features

- ▶ Medium tall and predominantly single stem plant type
- ▶ Non pubescent, very long, attractive smooth quality pods
- ▶ Pods ready for first picking 45-50 days after sowing
- ▶ Excellent organoleptic taste
- ▶ Tolerant to powdery mildew disease



Hybrid Muskmelon NMMH-247



Special features

- ▶ Vigorous plant type and prolific fruit bearing
- ▶ Oval shaped uniform sized, creamy yellow fruits with strong & dense white colour netting
- ▶ Dark orange coloured, firm flesh with excellent sweetness and strong musky flavour
- ▶ Fruits ready to harvest within 70-72 days after sowing
- ▶ Excellent shelf life & highly suitable for long distance transportation
- ▶ Highly tolerant to fusarium wilt, PM, DM and CMV diseases

Hybrid Muskmelon NMMH-290



Special features

- ▶ Vigorous plant growth and fruits matures in 70-75 days
- ▶ Creamy yellow, oblong shaped, very firm rind with moderate netting, uniform sized attractive fruits
- ▶ Dark orange colour flesh, very small seed cavity with excellent sweetness & strong musky aroma
- ▶ Excellent shelf life and transportability
- ▶ Highly tolerant to fusarium wilt, gummy stem blight, PM, DM and CMV diseases.



Pumpkin Nirmal-36

Special features

- ▶ Attractive flat round uniform fruits
- ▶ Highly tolerant to mosaic virus disease
- ▶ Very high yielding



Performance of Maize NMH-5082, 4530 & NMWH-27



Mr. Avtar Singh, Village-Kanur
Tahsil-Derabasi, Dist-Mohali, Punjab



Mr. Surender Singh, Village-Isru
Mandal-Khanna, Dist-Ludhiana, Punjab



Performance of White Maize NMWH-27
at Kundan Nagra Dist Farukabad, UP

Performance of Cucumber 388, N -61 (Nagina)



Farmer- Mula ji., Village- Dera Besi, Zirakpur

Performance of Bhendi-N-1684



Farmer- Girdhari, Village- Saidpura (Derabesi, Zirakpur)

Performance of Maize NMH-5082



Farmer- Pal Singh S/o Dyal Singh, Village- Derabesi

Performance of Maize NMH 4530



Farmer- Surender Singh S/O Madan Singh
Village -Issru Khanna (Ludhiana)



Performance of Maize NMH 4530



Farmer – Ranjeet Singh, Village –Sadwara (Yamunanagar)

Performance of Bajra N-4915



Farmer - Rambir s/o Raj Singh, Village- Vill. Jatt (Rewari)

Performance of Bjara N 4915



Farmer–Ajet Singh, Village-Vill. Jatt (Rewari)

Performance of Bjara N 4915



Farmer– Parveen Sarpanch, Village- Mayanwas (Gurugram)

Performance of Tomato-2257



Maurya Beej Bhandar, Atrauli, Dist-Hardoi (UP)

Performance of Okra-1684



Okra field at Maharajgunj

Performance of Pea-20



Pea-20 at Sidharthnagar



Performance of Deshi Cotton NACH-18 & NACH-436 in Tamilnadu



Farmers- Mani Pullagoundanpatti, Village-Eddapadi T.K. Salem District (Tamilnadu) Mobile: 9095222678

Cotton NACH 18 & 436 was sown by this farmer during March 2016 and he got good yield of 20 qtl/acre. Due to drought condition the farmer left the land ideally without doing anything. Fortunately last couple of month that area got a reasonable rainfall and cotton refreshed again without any maintenance. This variety is good drought resistant

Performance of Bittergourd-951



Farmer–Nasarapu Naidu
Village-Yellavaram, Mandal-Narsipatnam,
Dist-Visakhapatnam (AP)

Performance of Bhendi 1684 (Kajri)



Farmer–Ramalla kota, Village-Mandal Veldurthy, Dist. Kurnool



Excellent performance of Radish in seed production at Ludhiana (PB)



Visit of Hon. CMD to Dealer's Shop & Guava field in UP



Visit to Laxmi Beej Bhandar at Salempur, Dist-Dewaria (UP)



Visit to Guava field at Maliehabad Dist-Lucknow (UP)

Visit of Hon. Director Dr. S. S. Patil to Various Seeds Processing plants



Mangalam Seeds Processing plant at Gohad, Dist. Gwalior



Guna Trikuta Seeds Processing Plant at Guna (MP)

Visit of Hon. Board of Directors to Sahyadri farm at Nashik



◆ Eminent Guests



Hon. CMD Shri R.O.Patil & Director Shri D.R.Deshmukh & Dr. J.C.Rajput felicitated Hon. Shri Kishor Raje Nimabalkar (Collector-Jalgaon district)



Hon. Shri Sanjay Raut (Member of Parliament) visited Nirmal Seeds along with Hon. Minister of State Shri Gulabrav Patil. Hon. CMD Sir felicitated the distinguished guests



AGM, Finance & Admin. Shri S.S.Patil explaining Nirmal activities to Mr. K.C.Kotaiah, AGM, Nagpur and Mr. Kishor Kumar Varma, Chief Manager Vijay Bank, Jalgaon



Discussion between technical site visit team from DBT and Hon. CMD with Director of Research



Visit of Dr. Alok Adholeya (Director of Biotechnology and Bioresources Division at TERI (The Energy and Resources Institute), New Delhi.



All Zonal Manager Meeting at Nagpur



Hon. CMD Shri R.O.Patil addressing Zonal Manager Pre-season Meeting held at Hotel Radisson Blu Nagpur

Annual budget meet of Marketing held at Novotel Mumbai during 5th to 7th May 2017



Bio-Input Division



Hon. Director of Research Dr. J.C.Rajput addressing the Bio Input division during the in house training programme

Seed Production Department



Hon. Director of Production Shri. D.R.Deshmukh addressing the Seed Production Department during in house training programme



Quality Assurance Department



Training on Goods and Services Tax (GST)



GST Training



Mr. Prabhu Desai, Legal advisor addressing Nirmal's HOD's on Goods and Services Tax (GST) issues

Finance, Accounts & Logistics Department at Pachora



R & D Division



Research Co-ordinator Mr. I.S.Halkude explaining the achievements of R&D to Hon. CMD, Hon. Director of Research during Annual R&D Meeting

Account Department at Agra



◆ Internal Trainings of Different Departments



Addressing the Nirmal Team during training programme



◆ **Trainings, Conference and Seminar**



Hon. AGM (Finance & Administration) Shri. S.S.Patil during personation of results of Financial Year 2016-17 on 31st March 2017

Regional Managers Marketing Review Meeting at Agra



Account Department at Kolkata



Mr. M.T.Sable (Manager Quality Assurance) Participated in National seed seminar on “Food Security through augmented seed supply under climate uncertainties” at IARI New Delhi

◆ **New Joinings**



Mr. Vasant Wayal
AGM - Co-ordination



Mr. Jitendra K. Ghodke
Regional Manager
Mktg (Chikhali)



Mr. Pradeep Singh Baghel
Dy. Regional Manager
Mktg (Rewa)



Mr. Deepak P. Patil
Plant Engineer
(Pachora)



Mr. Pushpender Singh Tiger
Area Sales Manager
Mktg (Karnal)



Mr. Gaurav Singh Choudhary
Area Sales Manager
Mktg (Dausa)



Mr. Amit S. Ujade
Area Sales Manager
Mktg (Dhule)



Mr. Prashant Kumar Baghel
Area Sales Manager
Mktg (Ambikapur)



Mr. Vijay D. Boghara
Area Sales Manager
Mktg (Rajkot)



Mr. Dilip D. Bankar
Area Sales Manager
Mktg (Bhandara)



Mr. Lalit Kumar
Area Sales Manager
Mktg (Jalandhar)



Mr. Vivek Singh
Area Sales Manager
Mktg (Baikunthpur)



Mr. Gurmeet Singh
Area Sales Manager
Mktg (Bathinda)



Mr. Dhairyashil A. Patil
Area Manager
PD (Jalgaon)



Mr. Vikrant S. Patil
Plant Breeder
R & D

◆ **Twinkling Stars**



Harshal M. Alone
Qualified JEE (Main) &
sought admission for B.Tech
(Marine Engineering) at
Indian Maritime University, Kolkata



Amol P. Nikam (Shimpi)
Diploma in Engineering
SCNA/CCNA+ (Grade A+)



Samarth G. Gangurde
Diploma in Mach. Engineering
First Class



Uchita V. Mahajan
B.Sc. (Statistics)
A Grade



Yashashri M. Alone
92.60% in SSC exam.



Sneha Himmat Chaudhari
92.20% in SSC exam.



Hitesh V. Mahajan
86.00% in SSC exam.



Avinash S. Khandagale
82.80% in SSC exam.



Nikita Vinod Patil
3rd Inter School
Taluka level Chess competition



Tanisha Jagdish Ghodke
2nd Std. (Grade A-1)

◆ New Packing /New Product Launches



◆ News & View



NSPL's Head Office



NSPL's Research and Development Center





On the occasion of Republic Day 26th January 2017, Hon. CMD hoisted the flag.

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