

NIRMAL SEEDS PVT. LTD., PACHORA

# Nirmal Doot

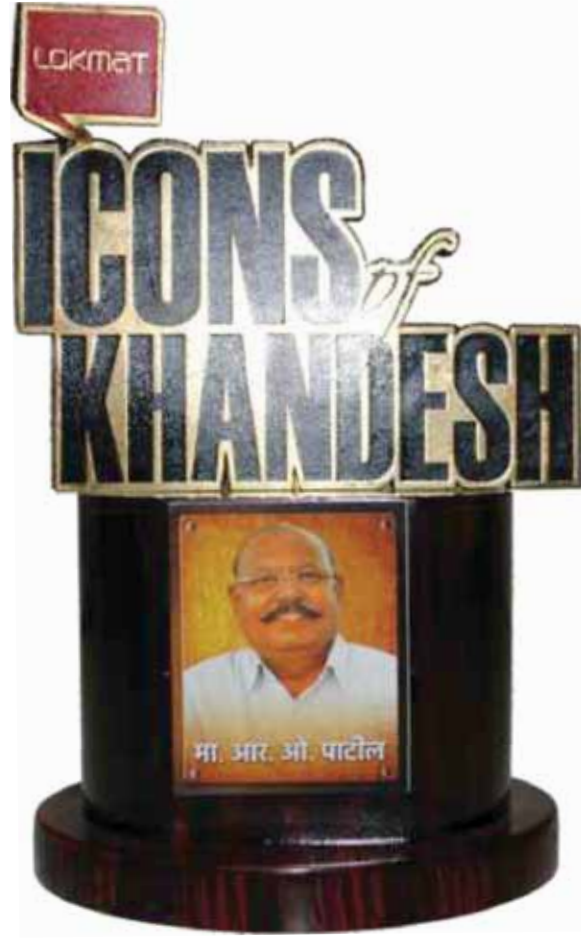
Issue : XI

26th January 2015.

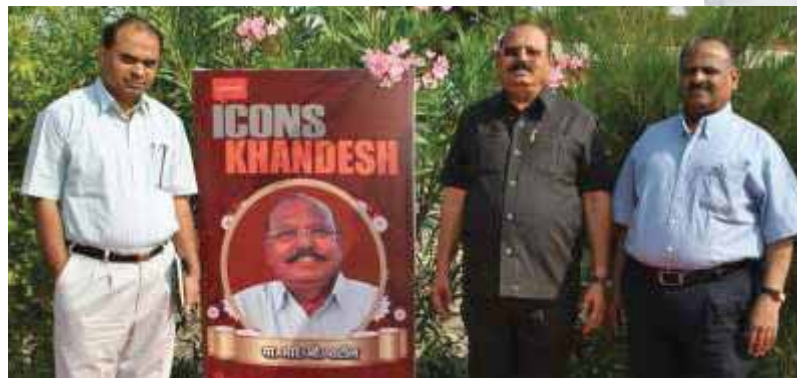
**Nutritional breeding  
future need of agriculture...**



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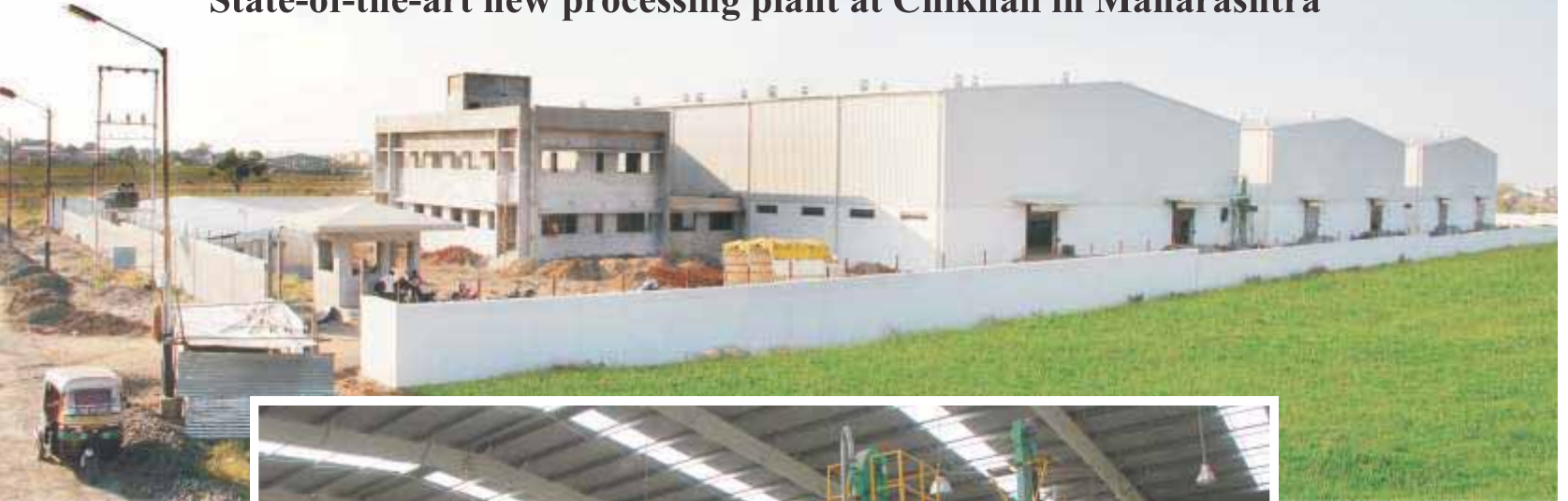


यह सम्मान है इस भूमिपुत्र का,  
जिसने किसानों के जीवन में  
खुशहाली का बीज बोकर  
उनके जीवन में खुशियाँ लायी...  
यह सम्मान है इस मिट्टी का,  
जिस मिट्टी में ऐसे कर्मविर भूमिपुत्रों ने  
जन्म लेकर अपने कर्मों से इसका  
गौरव बढ़ाया...



भारत के भुतपूर्व राष्ट्रपती मा. श्रीमती प्रतिभाताई पाटील के कर कमलो द्वारा  
“लोकमत आयकॉन खान्देश” सम्मान स्विकारते हुए  
श्री. तात्यासाहब आर. ओ. पाटील  
(चेअरमन तथा प्रबंध निदेशक, निर्मल सीड्स)

**“State-of-the-art new processing plant at Chikhali in Maharashtra”**



## ◆ Editor's message

निर्मल साथियों,

आप एवं आपके परिवार के सभी सदस्यों को गणतंत्र दिन एवं नया साल हर्ष और मंगल से परिपूर्ण हो, इसलिए हमारी ओर से आप सभी सदस्यों, वितरक तथा विक्रेताओं एवं किसान भाईयों को हार्दिक शुभकामनाएं। 'निर्मल दुत' का यह 11 वां अंक प्रकाशित हो रहा है। इस 11 वे अंक के माध्यम से आप के समक्ष आते हुए हमें हार्दिक प्रसन्नता हो रही है। इसका कारण हमारी गृहपत्रिका निर्मल दुत ने आज 5 वर्षों का सफर तय किया है। हमारा ध्येय सिर्फ अनुसंधान करने तक ही सीमित नहीं है, बल्कि कंपनीकी अनुसंधानीय गतिविधियों की जानकारी किसानों तक पहुंचाना भी हमारी जिम्मेदारी है। इसी जिम्मेदारी को निभाते हुए हम 5 साल से गंभीरता पूर्वक प्रयास कर रहे हैं। हमारे सभी निदेशकों का सशक्त मार्गदर्शन और आपका संपूर्ण सहयोग का ही परिणाम है कि हम यहां तक पहुंचने में सफल हो पाए हैं।

'निर्मल दुत' के प्रकाशन का मुख्य उद्देश्य किसान, वितरक - विक्रेता एवं कंपनी के बीच सुसंवाद निर्माण करना और कृषि प्रौद्योगियों को किसानों तक पहुंचाना है। किसानों के खेती की उत्पादकता बढ़ाने हेतु नवीनतम कृषि तकनीकीयों को अपनाने के लिए 'निर्मल दुत' के जरिए अपनी कृषि अनुसंधान उपलब्धियों तथा नवोन्मेषी विकसीत तकनीकीयों को देश के किसानों तक पहुंचाया गया है। ताकि वे अपने सामाजिक, आर्थिक स्तर को सुधारकर अर्थव्यवस्था को सुदृढ़ बनाने में योगदान दे सकें।

हमारे किसानों का जीवन संघर्ष से भरा हुआ है। कितनी भी विपदाएं या बाधाएं आए तो भी खेती करना छोड़ते नहीं, बिना विचलीत हुए संघर्ष के साथ उनका सामना करते हैं। 'निर्मल दुत' के माध्यम से हमने किसानों के लिए किए जा रहे अनुसंधानों के साथ नई जानकारीयां भी दी जो की ज्ञानवर्धन में सहायक सिद्ध हुयी है।

'निर्मल दुत' के सभी अंक विशेष रूप से किसानों एवं हमारे वितरक-विक्रेताओं के बीच अत्यंत लोकप्रिय हुए हैं। इस में अपने लेखों, विचारों आदि के माध्यम से सहयोग देनेवाले सभी प्रतिभागी धन्यवाद के पात्र हैं। अनेक गणमान्य संस्थाओं, व्यक्तियों से कभी पत्रों के माध्यम से, कभी व्यक्तिगत रूप से इस गृहपत्रिका को मिल रहे स्नेह हमारे मनोबल में वृद्धि करते हैं। कंपनी के सभी सदस्यों को हमारी शुभकामनाएं हैं कि निर्मल सीड्स के प्रगती का सफर सक्रियता से जारी रखे और 'निर्मल दुत' को लोकप्रियता के उच्चतम शिखर तक पहुंचाने में सहायक बने। हमें पुरा विश्वास है कि हमारे साथियों के सहयोग से हम और भी आगे बढ़ पाएंगे।

'निर्मल दुत' का हर अगला अंक बेहतर हो, इस दिशा में हम सर्वदा कार्यरत रहेंगे।

एस.एस.पाटील

पी.ए.दलवी

रवि चौरपगार



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We welcome your suggestions and valuable comments. Please e-mail us your views on the magazine at [info@nirmalseedsindia.com](mailto:info@nirmalseedsindia.com)



## ◆ CMD's message



1960 के पूर्व भारतीय बीज उद्योग मुलतः असंगठित, अव्यवस्थाबद्ध था। उस वक्त नॉन ब्रैंडेड और असंकर बीज की खपत थी। धिरे धिरे परिस्थितियों में बदलाव आता गया और निजी क्षेत्र की कम्पनियां प्लान्ट ब्रीडिंग अनुसंधान में प्रमुख भूमिका निभाने लगी है। अधिकतर अग्रेसर बीज उत्पादक कंपनियों ने अपने कुल कारोबार का 8 से 10 प्रतिशत खर्च अनुसंधान और संकर प्रजाती के विकास पर करना शुरू किया। अनुसंधानों में धान, गेहूँ, सोयाबीन और दलहनी फसलों की ओपन पॉलिनेटेड प्रजातियों तथा सब्जियों में संकर प्रजाती पर पुरा ध्यान दिया।

अधिकतम पैदावार हेतु उच्चतम श्रेणी का बीज अनिवार्य है, जब इसका पता चला तब किसानों द्वारा विभिन्न फसलों की अधिकतम पैदावार देनेवाली संकर बीजोंकी मांग बढ़ने लगी। उस समय भारतीय बीज उद्योग के पास बीज उत्पादन, सर्टीफिकेशन, क्वॉलिटी अंशुर्न्स और विपणन के लिए बुनियादी सुविधाएँ सिमित थी।

भारत सरकारने कृषि क्षेत्र में पहल करते हुए साहसी निर्णय लिए जैसे की ब्रिडर सीड और फाऊंडेशन सीड के गुणन के लिए निजी क्षेत्र को वितरीत करना, जर्मप्लाज़्म आयात करने के लिए नयी बीज पॉलिसी बनाना, बीज क्षेत्र में विदेशी निवेशकों की इक्रिटी भागीदारी को 51% तक स्थापित करना, बीज उत्पादन की बुनियादी सुविधाओंको मजबूत करने के लिए विदेशी बैंक अर्थसहाय्यता लेना जिसकी वजह से भारतीय बीज क्षेत्र में काफी बदलाव आया।

अब भारतीय किसान भी सचेत हो गया है। उसने यह समझ लिया है की, बीज केवल लागत नहीं बल्कि, एक उत्तम निवेश है। फसल की कुल लागत में बीज के मुल्य की हिस्सेदारी सिमित होती है। किसानों के बदलते हुए दृष्टीकोन ने भारतीय बीज उद्योग में नयी चेतना जगा दी है। जिसका परिणाम बि.टी. कपास तथा अन्य अनुसंधानीत एवं संकर उन्नत किस्मों का निर्माण करना शुरू कर दिया जिसे किसानों को अधिक पैदावार मिलने लगी और वह समृद्ध होने लगा।

भारतीय बीज उद्योग अपने किसानों की आशा – आकांशाएँ सफल करने हेतु किसानों द्वारा अनुसंधान एवं विकास कार्यों में तथा बुनियादी सुविधाओं के लिए निवेश जुटाने के लिए लगातार प्रयास कर रही है, ताकि अत्यधिक उपजशील किस्मों का निर्माण हो।

केंद्र सरकार द्वारा विभिन्न फसलों के न्यूनतम मुल्य निर्धारित करने का कार्य किसानों को अधिक मात्रा में फसल करने हेतु प्रोत्साहित किया है। सरकार द्वारा किसानों को दिये जाने वाले अनुदान समय समय पर अन्य सहायतायें बीज उद्योग के विकास में सहायक सिद्ध हुए।

निजी और सार्वजनिक क्षेत्र दोनों ने मिलाकर भारतीय बीज उद्योग को एक नया आयाम दिया है। भारत में लगभग 550 से अधिक बीज कम्पनियाँ कार्यरत हैं। आज भारतीय बीज उद्योग कारोबार में दुनिया में चीन के बाद तिसरे स्थान पर है। हम में वह क्षमता है, हमारे पास वह बाजार है कि हम दुनिया में नंबर एक के स्थान पर पहुँच सकते हैं। लेकिन इस के लिए हमें बृहद पैमानेपर कार्य करने होंगे और देश के एवं दुनिया के अगम्य क्षेत्र के किसानों तक पहुँचना होगा। हालाकि देखा जाए तो उपभोक्ताओं का हित और बीज कम्पनीयों की

दृष्टी से दलहनी फसले और संकर सब्जियाँ ही महत्वपूर्ण रही है। और भविष्य में अधिक उपजवाली संकर किस्मों से ही उपज में वृद्धि हो सकती है।

भारत सरकार पि.डी.एस. के जरिए पोषण युक्त अनाज वितरीत करने की योजना बना रही है। इस प्रकार के पोषण युक्त अनाज का उपयोग करके हम कुपोषण की समस्या का हल ढूँढ सकते हैं।

ग्लोबल वार्मिंग एवं जैविक-अजैविक तनाव की वजहसे पर्यावरण का विपरीत परिणाम गेहूँ, धान आदि अन्य फसलों पर पड़ रहा है और आनेवाली परिस्थितियों का सामना करने के लिए संकर तथा अनुसंधानीत प्रजातियाँ अधिक अनुकूल रही है। इस लिए धान मक्का, दलहनी, आदि के संकर बीजों का बीज उद्योग में बहुत अधिक महत्व है और आनेवाले दिनों में संकर बीजों का भविष्य काफी उज्ज्वल है।

इन्ही सब बातों को मद्देनजर रखते हुए निर्मल सिडस् ने अनुसंधान, उत्पादन, प्रसंस्करण और विपणन से संबंधित गतिविधियों को नया रूप देते हुए बदलते हुए परिवेश में भारतीय कृषि व्यापार में अपनी पहचान बनायी है। खेतों की उत्पादकता तथा किसानों का विकास जैसे लक्ष्यों को प्राप्त करने की दिशा में निर्मल सीड्स की मुख्य भूमिका सर्वज्ञात है।

हमने हमारे अनुसंधान कार्यों को धान, मक्का और सब्जियों के संकर प्रजाती के विकास पर केंद्रित करते हुए पुरा जोर दिया क्योंकि आनेवाले सालों में यही महत्वपूर्ण फसलें हैं जो भारतीय बीज उद्योग को गतिमान कर सकते हैं।

इन सबके अलावा हम न्युट्रीशन ब्रीडिंग क्षेत्र में अग्रणी रूप से काम कर रहे हैं। हमने बाजरा एवं गेहूँ की फसलों में न्युट्रीशन ब्रीडिंग को अधिक महत्व दिया, ताकि अधिक मात्रा में लोह एवं जिंक (जस्ता) से परिपूर्ण उत्तम अनाज का निर्माण हो। जिससे लोगों के आहार में जिंक और लोह जैसे पोषक तत्वों की कमी ना हो। जिसके अंतर्गत इस साल कम्पनी ने आय.सी.टी.पी. – 8203 (एफ ई) का करिब 363 मे. टन बीज किसानों तक पहुँचाया है। देश की बढ़ती जनसंख्या और कुपोषण की समस्या को देखते हुए हमने हार्वैस्ट प्लस के साथ मिलकर गेहूँ में जिंक एवं अन्य सुक्ष्म तत्वों को बढ़ाने का अनुसंधान कार्य शुरू किया है। इस में हम ने शुरूआती सफलता भी प्राप्त की है और हमने कुछ बीज उत्तर भारत में ट्रायल के लिए दिया है।

हमने डि.एस.आय.आर., डि.बी.टी., टेरी, इक्रीसैंट और बिल अण्ड मिलिण्डा गेट्स फाऊंडेशन नामक अन्तर्राष्ट्रीय संस्थाओं के माध्यम से और देश- विदेशों के नामांकित वैज्ञानिकों एवं विश्व विद्यालयों के संयुक्त सहयोग से आज अनेक अनुसंधान प्रकल्पों को कार्यान्वीत किया है। हमें विश्वास है की इससे कृषि क्षेत्र में क्रांती आयेगी। हमारा पहला प्रकल्प है – सरसों के तेल में पाये जाने वाला युरिसिक एसिड और ग्लुकोसिनोलेट जैसे हानिकारक घटकों को कम करना और बड़े पैमाने पर इस शुद्ध तेल की उपलब्धी करना। इसी दिशा में हम निरंतर अनुसंधान कर रहे हैं।

दुसरा प्रकल्प है डेवलपमेंट ऑफ वाइरल रेजिस्टेंट ओकरा। भिण्डी फसल पर बड़े पैमानेपर आनेवाला एवं नुकसान करनेवाला रोग याने येलो वेन मोझेक वाइरस। आज इसके लिए कोई इलाज नहीं है। हमने डि.बी.टी.और दिल्ली विश्व विद्यालय के सहयोग से नये तंत्रज्ञान के अनुसार आर. एन. ए. (आय) कन्स्ट्रक्ट



विकसीत कर उसे भिण्डी बीजों में डालकर अनुकीय बदल करने वाली प्रक्रिया को शुरू किया है। इससे किसानों को अधिक लाभ मिलेगा। यदि हमें सफलता मिली तो निर्मल सिडस् इस कार्य में पहली कंपनी मानी जाएगी।

तिसरा प्रकल्प - डेवलपिंग राईस रेजिस्टंट टू सॅलिनिटी अॅन्ड ड्राऊट। सुखे के कारण दिन प्रतिदिन पानी की समस्या बढ़ती जा रही है। परिणाम स्वरूप धान के उत्पादन पर विपरीत परिणाम हो रहा है। इस के लिए हमने क्रिन्सलैन्ड विश्वविद्यालय आस्ट्रेलिया के सहयोग से अनुसंधान शुरू किया है।

चौथा प्रकल्प-डेवलपमेंट ऑफ अॅन्थॅकनोज रेजिस्टंट चिली अॅन्ड कॅप्सीकम। अॅन्थॅकनोज जैसे रोग से मिर्च फसल में बड़ा नुकसान होता है। इस रोग का प्रतिबंध करने के लिए हमने कोरिया और दिल्ली विश्वविद्यालय के सहयोग से काम शुरू किया है।

महाराष्ट्र, गुजरात, और कर्नाटका में बड़े पैमाने पर अनार की फसल की जाती है। बैक्टीरियल ऑईली स्पॉट रोग की वजहसे उत्पादन लेना बहुत कठिन हो गया। इस रोग का जादातर फैलाव प्लांटिंग मटेरियल से ही होता है। यदि किसानों को रोग मुक्त प्लांटिंग मटेरियल सप्लाय किया जाये तो उनका उत्पादन बढ़ेगा

इस लिए हमने अनार में टिश्यु कल्चर के माध्यम से भगवा प्रजाती विकसीत की जिसकी बड़ी मांग है।

बढ़ती हुई जनसंख्या, जलवायु परिवर्तन, उत्पादन की बढ़ती लागत, उच्च उपजशील किस्मों तथा जैविक उत्पादों की बढ़ती मांग और बायो फोर्टीफिकेशन की आवश्यकता की चुनौतियों का सामना करने के लिए निर्मल सिडस् द्वारा अनेक पहलें की गयी हैं।

किसान को लोकल से ग्लोबल बनाने का हमारा प्रयास है। इसलिए नये नये प्रौद्योगिकियों को अपनाए जाने की आवश्यकता है। इसी को ध्यान में रखते हुए हमने हमारे अनुसंधान में आमुलाग्र परिवर्तन कर नई रणनीतियाँ और उच्च उपजशील किस्मों को विकसित किया है।

मुझे पुरा विश्वास है की हमारे निरंतर प्रयास तथा निर्मल सिडस् का अनुसंधान किसानों के लिए लाभप्रद होगा और भारतीय कृषि को प्रगति पथ पर ले जाने में योगदान देगा।

**आर.ओ.पाटील**

चेयरमन तथा प्रबंध निदेशक



## ◆ Articles

### दुसरी हरित क्रांती आणि पोषण सुरक्षा

आशिष वेले

अध्यक्ष, निर्मल सिड्स प्रा. लि.

भारतातील हरित क्रांतीचे जनक डॉ. एम. एस. स्वामिनाथन हे नेहमीच हरित क्रांतीचे श्रेय शेतीचे तंत्रज्ञान, तंत्रज्ञानाचा प्रसार, सरकारची इच्छाशक्ती आणि शेतकऱ्यांचा श्रमपूर्वक सहभाग या चार गोष्टींना देतात. सन १९६४ ते १९६८ या चार वर्षांच्या अल्पकालावधीत भारतातील गव्हाचे उत्पादन हे तत्पूर्वीच्या ४००० वर्षातील उत्पादनापेक्षा जास्त होते. म्हणूनच ह्या यशाला हरित “क्रांती” असे संबोधतात. उत्क्रांती ही दिर्घ कालावधीसाठी असते आणि क्रांती ही कमी कालावधीत यशस्वी केली जाते. गेली चार दशके भारताने ह्या हरित क्रांतीच्या यशस्वीतेच्या जोरावर अन्न असुरक्षीत परिस्थितीतून अन्न सुरक्षा विधेयकापर्यंत मजल मारली.

स्वातंत्र्यपूर्व कालावधीतील बंगालच्या दुष्काळातील अपरिमीत मनुष्य हानीचा आकडा हा आजही मानवी इतिहासातील एक भयंकर घटना म्हणून त्याचा उल्लेख केला जातो. स्वातंत्र्यानंतरच्या दोन दशकांच्या कालावधीत वाढत्या लोकसंख्येच्या पोटाची खळगी भरण्यासाठी अमेरिका आणि पाश्चिमात्य देशातील धान्य आयातीवर आपला देश अवलंबून होता. पण वर उल्लेखीत हरित क्रांतीच्या सुवर्णाक्षरांनी उल्लेख करावयाच्या प्रयत्नातून भारताने श्रमपूर्वक आणि स्वबळावर अन्न सुरक्षा प्रस्थापित केली.

भारतीय कृषी क्षेत्रातील दिर्घ कालीन प्रगतीचा तक्ता :

वर्ष	१९५०-१९५१	१९७०-१९७१	१९९०-१९९१	२०१०-२०११
अन्नधान्य (दशलक्ष टनामध्ये)	५०.८	१०८.४	१७६.४	२५९ (२०११-१२)
दुग्ध (दशलक्ष टनामध्ये)	१७	२३ (१९७३-७४)	५३.९	१२७ (२०११-१२)
मासे (दशलक्ष टनामध्ये)	०.७५	१.७५	३.८४	८.००
अंडी (अब्ज संख्यामध्ये)	१.८	७.८ (१९७३-७४)	२१.१	६०.००
फळे व भाजीपाला (दशलक्ष टनामध्ये)			८५	२२१
लोकसंख्या (दशलक्षामध्ये)	३६.१	५४८	८४६	१२१०

स्रोत : गव्हर्नमेंट ऑफ इंडिया, डिपार्टमेंट ऑफ अॅग्रीकलचर अँड कोऑपरेशन, अॅग्रीकलचरल स्टॅटिस्टिक्स अँड अ ग्लॉस (व्हेरीअस इश्यूज)

गेल्या सहा दशकांमध्ये साधारणपणे १९५०-५१ ते २०१२-२०१३ पर्यंतची भारतीय शेतीतील उत्पादनाच्या प्रगतीतील आकडेवारी वरील तक्त्यात दर्शविली आहे. ही आकडेवारी फक्त बोलकी नसून शेती क्षेत्रात काम करणाऱ्या कोणत्याही व्यक्तीस अभिमानाने घाती फुलून येईल अशी आहे. परंतू जागतीक आकडेवारीशी तुलना करतांना आणि भारतातील कुपोषणाशी त्याचा संबंध जोडला असता प्रगतीसाठी अजूनही मोठा वाव आहे आणि प्रचंड काम करण्याची गरज आहे. एका पाहणी अहवालानुसार जगाला २००४ साली जेवढा तांदूळ पुरवठा झाला त्यापेक्षा दिडपट जास्त तांदूळाची गरज २०३० साली असेल. मात्र शेती योग्य जमीन ३० % कमी झालेली असेल. या आकडेवारी वरून शेती क्षेत्राला तंत्रज्ञानाच्या जोडीची किती प्रचंड गरज आहे याचा अंदाज येतो.

आजही भारतीय अर्थशास्त्र हे १४ % शेतीच्या जीडीपी (GDP) वर अवलंबून आहे आणि ५० % हून अधिक रोजगार हा शेतीनिर्मित असून बहुतांशी भारतीय नागरीकांचा ५० % पेक्षा जास्त कौटुंबिक खर्च हा अन्नधान्य खरेदीवर होतो. १२ व्या पंचवर्षीक योजनेत शेतीपुरक नियोजन आराखड्यावर भर दिलेला आहे. सुदैवाने तत्कालीन पंतप्रधान श्री. मनमोहनसिंग आणि विद्यमान पंतप्रधान श्री. नरेंद्र मोदी यांचे दुसऱ्या हरित क्रांतीच्या

गरजेबद्दल एकमत आहे. ही दुसरी हरित क्रांती सदाहरीत क्रांती व्हावी अशी तिघ्र इच्छा डॉ. एम. एस. स्वामिनाथन हे नेहमीच विषद करीत असतात.

दुसऱ्या हरित क्रांतीच्या कालावधीतील उत्पादन वाढ आणि त्याला असलेल्या सार्वजनिक वितरण व्यवस्थेच्या जोडीमुळे भारत अन्न सुरक्षेचा पल्ला गाठू शकला. परंतू ह्याच कालावधीत पोषण सुरक्षा (Nutritional Security) त्यामानाने दुर्लक्षित राहिली असे जाणवते. दुसऱ्या हरित क्रांतीच्या माध्यमातून पोषण सुरक्षा मिळविण्याची गरज सर्व शास्त्रज्ञ, सरकार आणि शेतकरी ह्या सर्वांनाच लक्षात घ्यावी लागेल.

म्हणूनच दुसरी हरित क्रांती ही गहू किंवा तांदूळ या पिकांपुरती सिमित न राहता बाजरी, ज्वारी, नागली तसेच कडधान्य ह्या पोषक पिकांवर आधारित करावी लागेल. वर उल्लेख केलेली पिके ही नैसर्गिक रित्या जास्त पोषण मुल्य देणारी आहेत. उदाहरणार्थ कडधान्यांमधून प्रथिने आणि भरडधान्यांमधून सुक्ष्म अन्नद्रव्ये जसे की लोह आणि जस्त. (डॉ. एम. एस. स्वामिनाथन भरडधान्यांना पोषक धान्ये म्हणून संबोधू लागले आहेत. “Bharaddhanya” is course cereals termed as “Nutricereals” डॉ. एम. एस. स्वामिनाथन यांच्या प्रयत्नामुळे १२ व्या पंचवर्षीक योजनेत सार्वजनिक वितरण प्रणाली मार्फत गहू आणि तांदूळासोबत न्युट्रीसिरीयल्स (ज्वारी, बाजरी व नागली) यांचीही खरेदी आणि वितरण व्यवस्थेची अंमलबजावणी करणे ठरले आहे. वरील विषयास अनुसरून निर्मल सिड्स प्रा. लि. बाजरा या पिकामध्ये गेली अनेक वर्षे महत्वाचे संशोधन करीत आहे. हे संशोधन आणि विस्ताराचे कार्य हार्वेस्ट प्लस या आंतरराष्ट्रीय संस्थेच्या मदतीने गेली ४ वर्षे करीत असतांना काही अत्यंत सुखद अनुभव आलेत. त्यापैकी एक म्हणजे निर्मल सिड्सच्या रौप्य महोत्सवी कार्यक्रमाप्रित्यर्थ भारतीय हरित क्रांतीचे जनक डॉ. एम. एस. स्वामिनाथन यांनी निर्मल सिड्सला दिलेली भेट!.



लोहयुक्त बाजरीची पाहणी करताना डावीकडून डॉ. वुल्फगॅंग एच फिफर (हार्वेस्ट प्लस, काली), डॉ. एम. एस. स्वामिनाथन (भारतीय हरित क्रांतीचे जनक), प्रो. सुदामसिंग राजपूत (वरिष्ठ किटकशास्त्रज्ञ), श्री. मीर्लीद कुलकर्णी (बाजरा पिक शास्त्रज्ञ), श्री. आशिष वेले (अध्यक्ष, निर्मल सिड्स), डॉ. जे. सी. राजपूत (संचालक संशोधन निर्मल सिड्स).

जगामध्ये कुपोषण आणि भुकबळीची फार मोठी समस्या निर्माण झाली असून त्याकडे सर्वांचे लक्ष लागलेले आहे. एका पाहणीनुसार जगातील २०० करोड लोक कुपोषण ग्रस्त असून त्यातील सर्वात जास्त संख्या भारतात आहे. या समस्यांवर मात करण्यासाठी आहारातून अन्न द्रव्यांचे पोषण मुल्य वाढविण्यासाठी हार्वेस्ट प्लस च्या माध्यमातून बाजरा व





गहू पिकांमध्ये निर्मल सिड्स प्रा. लि. कंपनीने काम सुरु केले आहे.

लोह हा हिमोग्लोबीनमधला महत्वाचा असा एक घटक आहे की जो ऑक्सिजनला संपूर्ण शरीरात पसरवतो. तसेच स्नायुंची कार्यक्षमता वाढविण्याकरीता मदत करतो. या व्यतिरिक्त शरीरावरील ताण व रोग प्रतिकार शक्ती वाढविण्याचे काम सुद्धा लोह हा घटक करतो. जर मनुष्याला त्याच्या दैनंदिन आहारामधून पुरेसा लोह मिळाला नाही अर्थात लोहाची कमतरता असेल तर अशावेळी अॅनेमिया नावाचा आजार उद्भवतो. मानवी शरीर हे रोगप्रतिकार शक्ती वाढविण्यासाठी, कार्यक्षमता सुधारण्यासाठी, उर्जा निर्मितीसाठी आणि संपूर्ण अवयव प्रणालीमध्ये ऑक्सिजनचा पुरवठा वाढविण्यासाठी लोहाचा उपयोग करित असते.

लोहाच्या कमतरतेमुळे बोटांची नखे बारीक व ठिसूळ होतात. तसेच अल्सरसारखे आजार उद्भवणे, मेंदूच्या कार्यक्षमतेवर विपरीत परिणाम होणे, शरीरावर ब्रण, अशक्तपणा, पचनसंस्थेतील दोष व भुक्त मंदावणे यासारख्या समस्या निर्माण होतात. तसेच गरोदर मातांसाठी आणि गर्भाशयात वाढणाऱ्या लहान मुलांसाठी लोह महत्वपूर्ण असा घटक आहे. भारतामध्ये जवळपास ७४ टक्के मुले (वयोगट ६ ते ३५ महिने), ८० टक्के गरोदर माता आणि ५२ टक्के इतर माता ह्या लोहाच्या कमतरतेने ग्रस्त आहेत.

बाजरा पिक हे भारतातील प्रमुख धान्य पिकांपैकी एक महत्वाचे धान्य पिक आहे. जवळपास ९५ टक्के बाजरीचे उत्पादन हे आहारासाठी वापरले जाते. उत्पादन करणारे शेतकरीच बाजऱ्याचा मुख्य अन्न म्हणून उपयोग करतांना दिसतात. भारतामध्ये सर्वसाधारणपणे ९० लाख हेक्टरवर बाजरा पिकाची लागवड केली जाते. म्हणूनच अशा परिस्थितीमध्ये लोहयुक्त बाजरीचा प्रसार आणि वापर करण्यासाठी फार मोठा वाव आहे. जगातील विविध भागांमध्ये अन्नद्रव्यांच्या कमतरतेवर मात करण्यासाठी CGIAR (Consultative Group on International Agricultural Research) आणि IFPRI (International Food Policy Research Institute) या आंतरराष्ट्रीय संस्थांनी हार्वेस्ट प्लस च्या माध्यमातून सन २००४ मध्ये या प्रकल्पाला सुरुवात केली. या प्रकल्पाद्वारे भारतीयामध्ये लोह आणि जस्त या अन्नद्रव्यांची कमतरता असल्याचे दिसून आले आहे. दैनंदिन आहारामधून ही कमतरता भरून काढण्यासाठी सर्वात चांगला पर्याय व आर्थिक दृष्ट्या परवडणारा स्रोत म्हणजे बाजरा पिक!.



लोहयुक्त बाजरीच्या पाकीटासोबत श्री. आशिष वेले (अध्यक्ष, निर्मल सिड्स)

सुदैवाने निर्मल सिड्स प्रा. लि. कंपनीने ज्या बाजरी वाणाचे मार्केटिंग केले आहे तो म्हणजे आय. सी. टी. पी. ८२०३ हा वाण! या वाणाच्या नविन जातीमध्ये सर्वाधिक लोहाचे प्रमाण आढळून आले आहे. या संबंधी जनजागृती करण्यासाठी या प्रकल्पानुसार

हार्वेस्ट प्लस आणि निर्मल सिड्स यांनी लोहयुक्त बाजरीच्या विकासासाठी आणि त्याच्या वितरण प्रणाली संबंधी एक करार केला आहे. आज भारतामध्ये निर्मल सिड्स प्रा. लि. ही कंपनी हार्वेस्ट प्लस अंतर्गतच्या प्रकल्पामध्ये महत्वाची भूमिका बजावत असून नेत्रदिपक यशही प्राप्त केले आहे. या कार्यक्रमांतर्गत सन २०११-१२ मध्ये निर्मल सिड्सने यशस्वीपणे शेतकऱ्यांमध्ये जनजागरण अभियान राबविले आहे. त्याचाच एक भाग म्हणून २७ वेगवेगळ्या क्षेत्रावर लोहयुक्त बाजरी आय. सी.टी.पी. ८२०३-एफ ई (धनशक्ती) या वाणाच्या वेगवेगळ्या प्रकारच्या ५ अॅडाप्टीव्ह ट्रायल्स महाराष्ट्रातील सोलापूर, सातारा, नगर, नासिक आणि धुळे जिल्ह्यात खरीप २०११ मध्ये घेतल्या आहेत.

पिक वाढीच्या महत्वाच्या अवस्थेमध्ये लहान लहान शेतकऱ्यांना एका ठिकाणी आणून मोठ्या स्वरूपातील शेतकरी मेळावे घेण्यात आले. या मेळाव्यांना शेतकऱ्यांचा प्रचंड प्रतिसाद मिळाला.



लोहयुक्त बाजरीवर आयोजित शेतकरी मेळाव्याला संबोधित करतांना निर्मल सिड्सचे व्यवस्थापकिय संचालक श्री. तात्यासाहेब आर. ओ. पाटील.

बाजरी पिकातील काही संकरीत वाणांमध्ये सर्वसाधारणपणे लोहाची मात्रा ४७ मायक्रोग्राम्स प्रति ग्राम इतकी असते. परंतु लोहयुक्त आय. सी. टी. पी. ८२०३-एफ ई (धनशक्ती) या नविन वाणांमध्ये लोहाची मात्रा इतर वाणांपेक्षा जास्त आहे.

सन २०१२ मध्ये निर्मल सिड्स ने लोहयुक्त बाजरी बियाणे विक्रीसाठी ४००० किंमटलची योजना आखली होती. परंतु मध्य भारतामध्ये जेथे सर्वाधिक विक्रीचे लक्ष होते तो भाग कोरड्या दुष्काळाखाली आल्यामुळे आय.सी.टी.पी. ८२०३-एफ ई (धनशक्ती) ही लोहयुक्त बाजरी फक्त २३००० शेतकऱ्यांपर्यंत पोहचली. या व्यावसायिक विक्री व्यतिरिक्त ११० ठिकाणी फ्रंटलाईन डेमोस्ट्रेशनमध्ये आय सी टी पी ८२०३ या बिगर लोहयुक्त वाणापेक्षा आय सी टी पी ८२०३-एफ ई (धनशक्ती) हा लोहयुक्त वाण अधिक दर्जेदार, अधिक सरस व गुणवत्तापूर्ण आहे असे दिसून आले आहे. या संबंधी जनजागृती करण्यासाठी आणि लोहयुक्त बाजरी वाणाची शेतकऱ्यांना उपलब्धता व्हावी यासाठी तसेच बाजरीचे उत्पादन वाढविण्यासाठी निर्मल सिड्सने ५ मोठ्या स्वरूपातील २५००-३००० शेतकऱ्यांची उपस्थिती असलेले शेतकरी मेळावे घेतले आहेत. त्यासोबतच पिकाच्या कालावधीमध्ये प्रत्यक्ष शेतकऱ्यांच्या शेतावर २० छोटे कार्यक्रम सुद्धा आयोजित केलेले होते.

निर्मल सिड्स कंपनी ही जरी एक खाजगी कंपनी असली तरीसुद्धा या कंपनीचे प्रोमोटर्स, संस्थापक- संचालक हे कृषीतज्ञ असून त्यांना सामाजिक भान व जाण आहे. भारतामध्ये आय.सी.टी.पी. ८२०३-एफ ई (धनशक्ती) या लोहयुक्त बाजरीची विक्री करणारी एकमेव कंपनी ही निर्मल सिड्स होय. निर्मल सिड्स ने नोव्हेंबर २०१० मध्ये वाशिंग्टन डी सी येथील इंटरनॅशनल बायोफोर्टीफिकेशन कॉन्फरन्स मध्ये हा सर्व डाटा/माहिती सादर केलेली आहे. गरीब शेतकऱ्यांना उन्नत करून त्यांचे पोषणमुल्य वाढविणे हा कंपनीचा उद्देश आहे. या सर्व यशानंतर अशी खात्री आहे की शेतकऱ्यांच्या उत्पादनात वाढ होवून त्याला सरकारच्या माध्यमातून सार्वजनिक वितरण प्रणालीमध्ये जर ठेवता आले तर पोषण सुरक्षेच्या दृष्टीने तो फार मोठा अध्याय असेल. याचे पहिले श्रेय निर्मल सिड्सला



दिले जाईल. त्यादृष्टीने बाजरीला समाविष्ट करण्यासाठीची प्रक्रिया आता सुरु झालेली आहे.

लोहयुक्त बाजरीची गुणवत्ता, उत्पादकता व पोषणमुल्यता बघून विविध मेळाव्यां मधून शेतकऱ्यांची या बाजरीला वाढलेली मागणी दिसून आली आहे. त्यादृष्टीने निर्मल सिड्सने त्या दिशेने पाऊल टाकून काही संकरीत वाणांची निर्मिती सुरु केलेली आहे. सुदैवाने या सर्व बाजरी वाणांमध्ये समाधानकारक लोहाची मात्रा आढळून आलेली आहे.

उदाहरणार्थ - निर्मल संकरीत वाण एन.पी.एच-४९१५, निर्मल-७, एन.पी.एच.-४६०४, एन.पी.एच.-४१३३, एन.पी.एच.-४८२८ या वाणांमध्ये लोहाची मात्रा चांगल्या प्रमाणात आढळून आली आहे.

या वाणांपैकी एन.पी.एच-४९१५ हा वाण खरीप मध्ये राजस्थान, हरियाणा, उत्तरप्रदेश, मध्यप्रदेशच्या काही भागात उत्कृष्ट दिसून आला तर उत्तर गुजरात मध्ये उन्हाळी हंगाम २०१३-१४ मध्ये जास्त तापमानाला अतिसहनशील असल्याचे दिसून आले आहे. त्याचबरोबर त्याची गुणवत्ता, लोहाची मात्रा आणि प्रचलित वाणापेक्षा चाऱ्याची गुणवत्ता उत्तम आहे.

या सर्व यशानंतर निर्मल सिड्सने हार्वेस्ट प्लस सोबत सद्या जस्त आणि लोह हे अन्नद्रव्य गव्हामध्ये उपलब्ध करण्यासाठी गहू पिकावर काम सुरु केलेले आहे. त्यासोबतच लहान प्रमाणात बियाणे उत्पादनासाठी विविध ठिकाणी चाचण्या घेण्याची



प्रक्रिया सुद्धा सुरु झाली आहे. या सद्याच्या खरीप हंगामात लोहयुक्त बाजरीची ३५०० मेट्रीक टनापेक्षा जास्त विक्री करून ७५००० पेक्षा अधिक शेतकऱ्यांपर्यंत पोहचण्याचा निर्मल सिड्सने यशस्वी प्रयत्न केला आहे.

गेल्या आठ वर्षात जगातील अन्नधान्याच्या किमतीत जवळपास ५०% वाढ झाली. ही वाढ होण्यापुर्वी दारिद्र्य रेषेखालील लोकसंख्येच्या मासिक खर्चापैकी ३५ टक्के खर्च हा मुख्य अन्न जसे की गहू, तांदुळ, ज्वारी, बाजरी, मका व कसावा यांच्या खरेदीवर होत होता. ह्या भाववाढीनंतर मुख्य अन्न खरेदीवरील

खर्चाचे प्रमाण हे ६०% पेक्षा जास्त झाले. हे मुख्य अन्न जर योग्य पोषण देणारे असेल तर कुपोषणाचे प्रमाण अत्यंत किफायतशीर पद्धतीने आणि कायम स्वरूपी सोडविण्यासाठी निर्मल सिड्स बायोफोर्टीफिकेशनच्या भविष्यकालीन कार्यक्रमासाठी प्रतिज्ञाबद्ध आहे. ३ वर्षाखालील भारतीय मुलांमध्ये लोहयुक्त बाजरीचे पदार्थ त्यांच्या अन्नप्रणाली मध्ये समाविष्ट केल्यानंतर ह्या मुलांच्या लोहाच्या गरजेची संपूर्ण पूर्तता बायोफोर्टीफाईड बाजरी मार्फत होवू शकते हे जगप्रसिद्ध "जर्नल ऑफ न्युट्रीशन" च्या ऑगस्ट-२०१३ च्या अहवालात प्रसिद्ध झाले आहे.

या वरील विवेचनावरून हे स्पष्ट होते की दुसरी हरीत क्रांती ही फक्त अन्नधान्य उत्पादन वाढीवर आधारित नसून पोषण मुल्य वाढवण्यावर आधारित असेल आणि ती सदाहरीत क्रांती व्हावी असा वैज्ञानिक दृष्टीकोन ठेवून आपल्याला प्रयत्न करावा लागेल.

## Abhay and Akshay - Zinc rich varieties in Wheat Nirmal's Next step in the bio fortification work

Milind P. Kulkarni  
(Sr. Scientist Cereal Crops)

**Z**inc is an essential trace element for humans, animals and plants. It is vital for many biological functions and plays a crucial role in more than 300 enzymes in the human body. The adult body contains about 2-3 grams of zinc.

### Zinc is important for :

Growth and cell division, Fertility, Immune system, Taste, Smell, Appetite, Skin, Nails, Vision.

Zinc is also used as an anti-inflammatory agent and can help soothe the skin tissue, particularly in cases of poison, ivy, sunburn, blisters and certain gum diseases. Zinc is important for healthy hair. Insufficient zinc levels may result in loss of hair, hair that looks thin and dull and that goes grey early. There are also a number of shampoos which contain zinc to help prevent dandruff. Zinc is an essential mineral that stimulates the activity of about 100 enzymes in the body. It also supports your healthy immune system. It is necessary to synthesize DNA, wound healing. It supports the healthy growth and development of the body during adolescence, childhood and pregnancy. Though the actual amount of zinc

necessary to support the human body is quite small, its effects on the body are astronomical.

Zinc deficiency is a serious problem in many developing countries. Zinc deficiency is ranked as the 5th leading risk factor in causing disease, especially diarrhea and pneumonia in children, which can lead to high mortality rates in these underdeveloped regions. Other severe deficiency symptoms include stunted growth and impaired development of infants, children and adolescents. Early zinc deficiency also leads to impaired cognitive function, behavioral problems, memory impairment and problems with spatial learning and neuronal atrophy. Public health programs involving zinc supplementation and food fortification could help overcome these problems.

### Our body regularly needs zinc. Recommended daily intakes are:

Infants - 5 mg	Children - 10 mg
Women - 12 mg	Pregnant Women - 15 mg
Lactating Women - 16 mg	Men - 15 mg

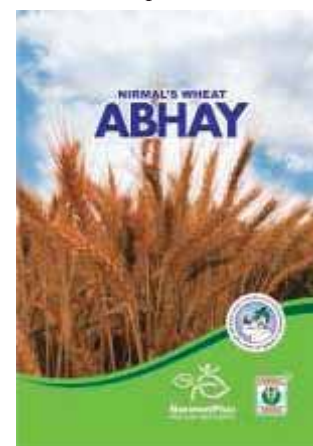
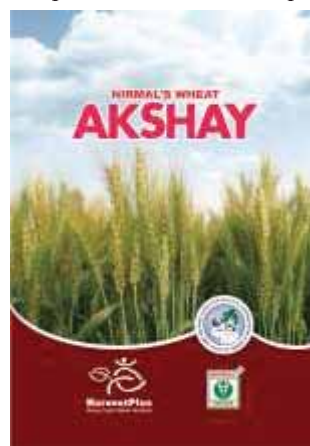


If you are concerned about your zinc intake, taking a good multivitamin should be sufficient. Be sure to only take the recommended daily dose, as zinc overdoses can also occur, which can be toxic to the body. Consuming too much zinc can cause nausea, vomiting and fever because too much of the mineral can interfere with how the body processes other minerals.

There are many sources to get the zinc in our diet. Wheat is one of them very important source which is the staple food in our daily diet. CIMMYT-HarvestPlus targeted to enrich the wheat varieties with the Zinc level to mitigate the deficiency in the human body. Nirmal Seeds is also one of the collaborative partners in this Wheat Biofortification activities in India. In this context we are evaluating number of zinc rich wheat entries over the locations to get the idea regarding adaptability and other yield related parameters coupled with the Zinc content. With the continuous efforts we are now at the stage to cater the Zinc rich wheat varieties viz. Abhay and Akshay. During the current Rabi season we have distributed about 250 trial kits each of these varieties in major wheat growing and targeted states in India viz., Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Chattisgarh, Maharashtra and Gujarat.

**The silent features of these two varieties are :**

Trait	Abhay	Akshay
Duration	120 days	110 days
Plant ht (cm)	95-100	95-100
Spike colour	Brown	White
Yield potential	40-45q/ha	40-45q/ha



## Nirmal's Innovative Research Strategy in Quality Okra Hybrid Development

N. D. Deshmukh  
(Plant Breeder)

Okra is one of the most popular vegetables grown throughout the tropics and warm parts of the temperate zone. Okra (Lady's finger) is major summer vegetable. In okra, an array of biotic stresses adversely affects the yield and quality of the product. Major concerns of growers are disease resistance, pest and drought tolerance. Among the important biotic bottlenecks include viruses, fungal pathogens, insect pests and mites.

The changing cropping pattern and the change in planting season will put pressure on the breeder's to develop adoptable hybrids for these conditions. The major producers are West Bengal, Bihar, Orissa, Andhra Pradesh and Gujarat. The okra is consumed in almost all states.

In okra, YVMV causes yield losses from 30 to 94%. It is going to be future menace of okra cultivation and need strategic breeding programme to evolve resistance against OELCV (Okra Enation Leaf Curl Virus). Meanwhile, today to escape occurrence of ELCV, it is better to avoid planting of okra crop in the hot, dry climate which probably present in April and May first fortnight.

NSPL has reputation in the okra seed market due to excellent

quality Seeds. The hybrids and varieties released so far; are ideal for sowing in kharif and summer season. We are dedicated in developing okra hybrids suitable for different locations as per the farmer's need.

Nirmal Seeds has released hybrids NOH-15, NOH-147, NOH-1336 and varieties like NOL-303 and NOL-101 which are being successfully cultivated by farmers. NSPL is working on projects viz; "Development of okra varieties resistant to YVMV using marker assisted selection" in collaboration with The Energy and Resources Institute (TERI), New Delhi and "Development of Viral resistant okra using RNAi approach" in collaboration with Delhi university. Major emphasis is being given to develop YVMV resistant germplasm lines to address the constraints in okra cultivation. Among the several germplasm; genetic resistance in specific genotype exploited commercially for Yellow Vein Mosaic. Development of resistant okra varieties made through identification and utilization of sources. The stable okra lines were screened initially under field conditions and then resistance was confirmed.

With this breeding methodology, NSPL has released YVMV



resistant hybrids viz; NOH-1648 and NOH-1684 in market during current year. The hybrids were tested in station trial, multilocation trials (50 locations) over last two years for reviewing acceptance in the market. We have obtained excellent feedbacks

from major locations of Gujrat, Bihar, Maharashtra, Rajsthan, Madhya Pradesh etc. especially from Vyara (GJ), Erandol (MH), Parola (MH), Murbad (MH), Phaltan (MH) etc.

**Special features of the hybrids :**

**NOH-1648**



**NOH-1684**



- A) Highly tolerant to Yellow vein mosaic virus disease.
- B) Attractive dark green, tender fruits with less mucilage.
- C) Long shelf life.
- D) Wider adaptability.
- E) Export quality fruit.
- F) Excellent taste and keeping quality.
- G) Very high yielding hybrid having short internode distance.
- H) Tolerant to Powdery mildew disease.

- A) Highly tolerant to yellow vein mosaic virus disease.
- B) Very dark Green coloured, straight, tender quality fruits.
- C) It has good fruiting, which starts from bottom & has short internodes.
- D) It has 2-3 side branches and gives soft marketable fruits.
- E) High yielding hybrid.
- F) Long shelf life.
- G) Wider adaptability.

## Performance of Maize "Nirmal-3662" in station trials

P. R. Patil  
(Plant Breeder)

Nirmal seed is working on Maize especially w.r.t. of development of inbred lines, hybrids and testing of new inbred, hybrids in different climatic conditions as the effects of genotype (G) and environment (E) interactions are very important. Hybrid requirement and preferences, in various regions are

different based on the climatic conditions, disease reactions as well as crop management conditions i.e Agronomy. Following are the details of state wise requirements of hybrids with major constraints in the production of Maize growing states.

State	Constraints in Production	Requirement
Karnataka & Tamil Nadu	Water stress, zinc deficiency and Turcicum leaf Blight	Kharif - Early, Midlate & late (stress tolerance) Rabi - Late maturing (Hybrid should be high yielding)
Rajasthan	Acute water stress, heat and lodging resistance, downy mildew resistance	Kharif - Early & Midlate (should perform well in average agronomy)
Maharashtra	Water stress & Turcicum leaf Blight	Kharif - Midlate & late Rabi - Late maturing
Andhra Pradesh	Water stress, zinc deficiency and Turcicum leaf Blight	Kharif - Early, midlate & late (stress tolerance) Rabi - Midlate & late



State	Constraints in Production	Requirement
Madhya Pradesh	Water stress, zinc deficiency	Kharif – All maturity groups Rabi – Midlate & late maturity
Uttar Pradesh	Water stress, water logging, low temperature (<10°C)	Kharif – All maturity groups Rabi – Midlate & late
Bihar	Water stress, zinc deficiency, flooding, cold temperature (<10°C)	Kharif – All maturity groups Rabi – Midlate & late maturity group (with hybrids suitable for high density planting)
Gujarat	Water stress and heat during kharif	Kharif – Early & midlate Rabi – Midlate & late (perform well in average agronomy)

- Punjab, Haryana, Bihar having highest cultivation of spring season Maize so again low temperature is the major constraint at initial growth stage.
- J&K, HP, Uttarakhand (Hill region), North Eastern (Hill region), Sikkim, Assam, Tripura, Nagaland, Manipur, Arunachal Pradesh. Extra early & early maturity hybrid for kharif season, negligible area under rabi Maize cultivation.
- While in West Bengal rabi Maize area is increasing from 17.2 (000'ha) to 65 (000' ha) during year 2010 to 2012 respectively.

By considering the requirement we conducted station trial of hybrids in five locations viz., Davangere (KA), Mandya (KA), Chittoorhar (RAJ), Sillod (MS) and R&D Bhadgaon (MH) during the kharif-2014 season and during rabi-2014 Samastipur (BH) and R&D Bhadgaon (MH). Based on the performance of hybrids our pipeline hybrid NMH-3662 was performing well in all locations w.r.t. of grain yield, lodging and cold tolerance, Turcicum Leaf Blight tolerance and performed well in water

stress condition. The hybrid NMH-3662 performs excellent under good management practices. The average grain yield was 80 qt/ha. during kharif & 44 qt/ac. during rabi season.

**Following are the important traits of hybrids NMH-3662.**

Duration..... 110-120 days (Kharif)  
135-145 days (Rabi)

Plant Height (cm).....230-240

Cob Length (cm).....20-22

No. of Grain Rows/cob..... 16-18

No. of Grains/ row.....40-45

**Special features:**

- Full maturity
- Semi-flint, Excellent tip filling
- Mid-tall, semi erect plant type
- Uniform ear size & shape with normal density planting (60X25 cm)
- High yielding single cross hybrid.



NMH-3662 performance at station trial Davangere with happy farmer.



Ear size at Chittoorhar.



NMH-3662 shows Excellent resistance for TLB at Mandya.



## Product development activities in Sikkim

V. K. Thakur (Regional Manager) Nation Chamling (Technical Officer)

**T**rial and Demonstrations are being carried out successfully at Krishi Vigyan Kendra, Namthang, South Sikkim in cabbage, cauliflower and tomato; Agriculture and Horticulture Farm, Namthang, South Sikkim in Kale using Nirmal’s bio-organic inputs viz., Bio Power, Bio Force, Bio Prahar, Bio Sanjivani; Nirmal’s Vegetable seeds are being grown for demonstration at 4th Mile near Singtam, East Sikkim and datas have been procured regarding Paddy (NR-48) trial against the local variety at 32 Mile, Singtam, East Sikkim.

Table 1. Comparison between Nirmal’s NR-48 (Parvati) and Local variety (Krishnabhog) was made regarding its yield and yield components in Paddy at 32 Mile, Martam, East District, Sikkim.

Sr. No.	Parameters	NR-48 (Parvati) (Average rounded off value)	Local Variety (Krishnabhog) (Average value)
1	Plant height	83 cm	135 cm
2	No. of effective tillers	18	12
3	Panicle length	20 cm	23 cm
4	No. of grains/spike	159	134
5	Bio mass weight (in 5 x 5 m <sup>2</sup> )	40 kg	12 kg
6	Seed yield (in 5 x 5 m <sup>2</sup> )	13 kg	6 kg



Krishnabhog ( Local variety)  
Comparing panicle lengths with NR-48.



NR-48 (Parvati) - Tillering capacity.



Biomass weight and seed yield observation  
(from 12.5 x 2 meters or 5 x 5 m<sup>2</sup>)





Trial on Effect of Bio-Power (Soil enricher) was also found to be showing positive results on the yield performance of Cabbage var. Stone head and Cauliflower var. White excel in comparison to that of control/check.

Table 2. Weight of heads from 5 plants each from Bio-Power applied plots and from control / check plots at the time of harvesting.

**Cabbage**

Plant Number	Weight of head from Bio Power applied plot	Weight of head from control plot
1	1.5 kg	900 gm
2	1.25 kg	1 kg
3	1.7 kg	1.1 kg
4	1.22 kg	1.2 kg
5	1.44 kg	950 gm

Table 3. Weight of curds from 5 plants each from Bio-Power applied plots and from control / check plots at the time of harvesting.

**Cauliflower**

Plant Number	Weight of head from Bio Power applied plot	Weight of head from control plot
1	750 gm	550 gm
2	580 gm	550 gm
3	600 gm	580 gm
4	700 gm	600 gm
5	680 gm	620 gm

Bio-Power was applied twice during the growth period of the plant, first just after transplanting and the other 15 days after as a feeding.



Bio Power applied plots of cabbage.



Control/check plots.



Harvesting from Bio-Power applied plots.



Data recording.



Curds and heads harvested from plots which were applied with Bio-Power.

In Horticultural Farm, Bermoik, South Sikkim, trials are being conducted in Radish and Cabbage using our Bio organic inputs viz., Bio Power and Bio Force. The effects of Bio Prahar is also being tested.



Trials conducted at Bermoik, Horticultural Farm.



Similarly, at Mazitar, East Sikkim, under the guidance of Deputy Director, Horticulture, Government of Sikkim, trials of Bio-Power and Bio Force are also been conducted in capsicum.



Bio-Power applied healthy Capsicum plants.

Nirmal's Mustard variety Palak is also showing good response in the field condition till date at two different Districts / locations of Krishi Vigyan Kendras viz., Mangan, North Sikkim and Namthang, South Sikkim.

Kale crop is also under trial using Nirmal's bio-organic inputs viz., Bio Power and Bio Force at Agriculture and Horticulture Farm, Namthang, South Sikkim which is being produced for its seed. The crop is showing good results. Seed yield after harvesting will be compared with the control plots.



Additional Director, Spices and Plantation crops, Govt. of Sikkim have taken up responsibility for conducting trials in 3 different locations viz.,

- i. Ravangla, South Sikkim in Cardamom
- ii. Dzongu, North Sikkim in Sikkim mandarin
- iii. Lingtam, East Sikkim in Cardamom using Bio-Power, Bio-Force, Bio Prahar, Trident and Bio Sanjivani. The trial is already under progress.

Trial on effect of Bio Prahar in potato against red ants/termites was also conducted at Krishi Vigyan Kendra, Namthang in the first forth night of November, 2014.



Earlier, trials on Bio Prahar (@5ml/ltr as soil drenching) had shown good results in controlling red ants/termites at Chumbung, Gyalsing, West Sikkim.

Sikkim state will soon be declared as an organic state and is currently working in its Sikkim organic mission; so, our AGM marketing (P. A. Dalvi) made a visit to Sikkim and met Government officials giving a proposal letter regarding the supply of Nirmal's bio organic inputs and for carrying organic seed production. Recently, it came to our information that this proposal have been forwarded from the Agriculture and Horticulture Secretary after their meeting to Sikkim Government indicating green signal in the near future.







## Nirmal Ridge gourd hybrid NRGH-370 possessing heat and yellow mosaic virus tolerance

G. B. Suryawanshi  
(Plant Breeder)

**R**idge gourd (*Luffa acutangula* (L.)Roxb.) is a popular cucurbitaceous vegetable in the Indian sub-continent. It is a monoecious viny vegetable. Ridge gourd is cultivated on a commercial scale and grown in homesteads for its immature fruits which are used as cooked vegetable. As tender fruits are easily digestible and appetizing, it is prescribed for those who are suffering malaria and other seasonal fever. It is quite lower in saturated fats as well as calories. It really is abundant with dietary fiber, vitamin C, riboflavin, zinc, thiamin, iron, as well as magnesium.

It is mainly cultivated in Andhra Pradesh, Tamil Nadu, Karnataka, Gujarat, Bihar, Uttar Pradesh, Assam, West Bengal and Kokan region of Maharashtra.

The crop is severely affected by Tomato Leaf Curl Virus (TLCV) a Geminivirus causing a yellow mosaic disease which results in 100% crop loss. It has recently been reported to be a host for Tomato Leaf Curl Virus (TLCV), which primarily infects tomato (*Solanum lycopersicum*) and other solanaceous crops world-wide. In *Luffa* spp., infection results in a yellow mosaic disease which is characterised by the presence of yellow spots on newly-emerging leaves, followed by mosaic patterning and upward curling of the upper leaves. In the event of a severe attack, TLCV results in small, distorted leaves, and mis-shapen fruit (Sohrab et al., 2003).

TLCV belongs to the genus Begomovirus in the family Geminiviridae and can be transmitted through sap inoculation or by whiteflies (*Bemisia tabaci*, Hemiptera, Aleyrodidae). *Luffa acutangula* (L. Roxb.) is an important Spring- Summer and rainy season vegetable crop on the North Indian plains, and is an all-year-round crop on the South Indian plains. In India, majority of high yielding and locally adapted ridge gourd hybrids/varieties were found susceptible to ridge gourd yellow mosaic virus resulted in low production and uneconomical for cultivation.

It is, therefore, important to identify virus resistant and/or tolerant lines and to transfer resistance gene(s) to valuable cultivated hybrids/varieties. *Luffa* spp. are indigenous to India and exhibit a wide diversity in their genetic composition. Considering the practical problems of viral disease management, the use of resistant crop hybrids & varieties is the most important and practical approach to achieve higher yields and quality through a suitable mating design. Breeding for resistant or tolerant genotypes requires the development of sensitive and efficient screening methods.

The R&D division of Nirmal Seeds Pvt. Ltd., developed large number ridge gourd hybrids by using promising 18 diverse ridge gourd germplasm and their cross combinations. Hybrids along with four checks were evaluated during Summer-2014 for heat and virus disease screening under natural epiphytotic conditions. A susceptible accession NRG-206 & hybrid NRGH-768 were grown as a infector (spreader) at every second and also planted at field border. All the recommended package of practices were followed except the plant protection measures for white flies.

During Summer-2014, Eight genotypes and 15 Hybrids were screened under natural epiphytotic conditions, when the proliferation of whiteflies results in a high incidence of TLCV disease symptoms. The experiment was laid out in randomized block design with two replications. Based on the incidence of TLCV disease, individual plants were scored, and their vulnerability index (VI) was calculated.

Table. 1. Scores, symptoms, and disease reaction associations used for vulnerability index (VI) calculations [Sohrab, (2005)].

Score	Symptoms	Genotype class
0	No symptoms	Immune (I)
1	Mild mosaic of young leaves covering < 10% of the surface	Resistant (R)
2	Mosaic of young leaves covering < 25% of the surface	Moderately Resistant (MR)
3	Mosaic of young leaves covering < 50% of the surface, blistering and puckering of leaves	Moderately Susceptible (MS)
4	Severe mosaic of young leaves covering < 75% of the surface, distortion of leaves	Susceptible (S)
5	Severe mosaic of young leaves covering > 75% of the surface, distortion of leaves and stunting of the plants	Highly Susceptible (HS)

Fig.1. Symptoms of mosaic virus on young leaves of Ridge gourd.



The observations on fruit yield per plant (g), yield tonnes/acre and mosaic viral incidence on plant were recorded. Reaction of hybrids against ridge gourd mosaic virus were scored by using 0 to 5 scale [Sohrab, (2005).]

The ridge gourd accession NRG-215, NRG-208 and hybrid NRGH-370, have shown high fruit yield (tonnes/acre), good heat tolerance and resistance against ridge gourd yellow



mosaic virus. The hybrid NBGH-370 have recorded highest fruit length (30cm), number of fruit / plant (8.20) & yield (4.63 tonnes/acre) with good heat tolerance and resistance to tomato leaf curl mosaic virus, over the check fruit length (26.5cm), number of fruit/plant (5.42) & yield (4.03 tonnes/

acre), respectively. This hybrid is being further retested for stability and reconfirmation.

Fig.2 Resistance of ridge gourd hybrid NRGH-370 against tomato leaf curl mosaic virus.



## Screening of pigeonpea for Sterility Mosaic Disease (SMD) resistance

Kishor R. Patole  
(Plant Pathologist)

### Economics of Disease :

Sterility mosaic disease is one of the most important disease of pigeonpea and is most damaging in Indian subcontinent. The annual yield losses due to SMD were estimated worth \$ 282 million in Nepal & India.

### Epidemiology :

The eriophyid mites vector (*Aceria cajani*) is responsible to transmit the disease. They are wind borne up to 2 km from the source of inoculum, both pathogen and mite vector are specific to *Cajanus cajan* and its wild relative *C.Scarabaeoides* var, *scarabaeoides*.

### Diagnostic symptoms :

SMD is often referred as “Green plague”. In the field, the disease can be easily identified from a distance as patches of bushy, pale green plants, without flowers or pods. The leaves of these plants are small and show a light and dark green mosaic pattern. Some pigeonpea varieties, example ICP-2376 exhibit

ring spot leaf symptoms (green islands surrounded by chlorotic areas), these indicate localized sites of infection of the pathogen and such a plants produce normal flowers and pods.



Infected plants without flowers & pods.



Infected leaf with ring spot symptoms.

### R&D Development

With considering the present scenario i.e. sterility mosaic disease problem in pigeonpea, Nirmal R&D division have started the screening of all pigeonpea genotype, parents & hybrids by creating own isolated SMD sick plot. From last two years we have screened release & pre-released products of pigeonpea by using ICPL-8863 (Maruti) as a susceptible check & BSMR-736 as a resistance check by following all screening techniques. From the last two year compiled data it clears that our released products like NTL-30 (Shri Durga), NTL-2, NTL-624 & NTL-900 shown tolerance to SMD.



## Nirmal's Mustard hybrids for setting new standard of performance in the market.

Vijay P. Hande  
(Plant Breeder)

The brassica oil crops are the world's third most important source of edible oil. In India, rapeseed mustard is the second most important group of oilseed crops and is grown in around 7.1 million ha with a production of 7.3 million tones (as per USDA estimates of 2014). The trend of mustard cultivation in the country as a whole, it has been on increase during the last five years the reason being the adoption of varieties with improved yielding ability. Considering the demand supply gap of edible oil in India, still there is huge growth potential in this segment.

Hybridization is a new concept in Indian mustard. Exploitation of yield heterosis is now being viewed as an important avenue to break the yield barrier. Heterosis in brassica has been known since 1954, however, its effectiveness at commercial level has been demonstrated only during the past one decade. On an average, 25% standard heterosis for yield has been observed in hybrids.

Nirmal Seeds has developed CMS based hybrids in Indian mustard with substantial yield advantage, coupled with high oil bearing grains and crop resisting to major biotic and abiotic stress over open pollinated varieties. The plant breeding efforts and best product testing network, for the last 10 years resulted in developing the hybrids in Indian mustard viz; "NIMH-10, NIMH-31 & NIMH-23" and these hybrids will be introduced for commercial cultivation from 2015.

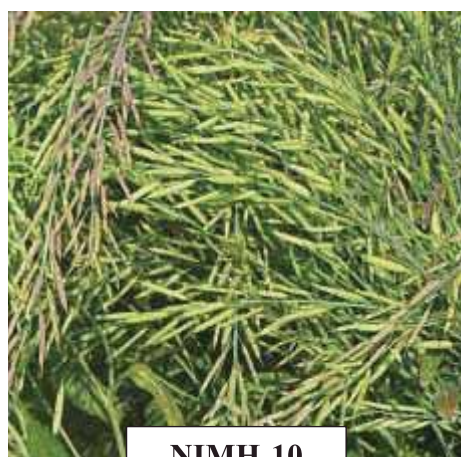
As the nation imports 50% of its edible oil requirement, the use of hybrid mustard is a strategy to lift the yield ceiling of mustard crop to help the India's meet the future projected demand, which will increase due to increasing population and rising income. Hybrid brassica breeding helps to provide farmers with an opportunity to improve productivity, particularly in potential high yield areas.

### Station trial data (R-2013) of mustard hybrids showing per cent heterosis over the best varieties

Sr. No.	Entry	Mean Yield (Q/ha)	% heterosis over variety	
			NML-100	Palak
1.	NIMH-10	32.82	25.69	
2.	NML-100	26.11		
3.	NIMH-31	32.16		26.01
4.	Palak	25.52		

### Morphological Characteristics of pre-released mustard hybrids

Characters	NIMH-10	NIMH-31	NIMH-23
Days to 50% flowering	35-40	40-45	30-35
Days to maturity	105-110	110-115	85-90
Plant height (cm)	150-160	180-190	150-160
Main shoot length (cm)	80-85	70-75	70-75
Sillique length (cm)	3.5-4.0	3.0-3.5	4.0-4.5
Seeds/sillique	13-15	13-15	14-16
1000 seed weight (gm)	5.0-5.5	4.5-5.0	4.0-4.5
Leaf hairyness	Sparse	Sparse	Dense
Dentation of leaf margin	Dentate	Serrate	Dentate
Sillique angle with main shoot	Open	Open	Open



NIMH-10



NIMH-31



NIMH-23



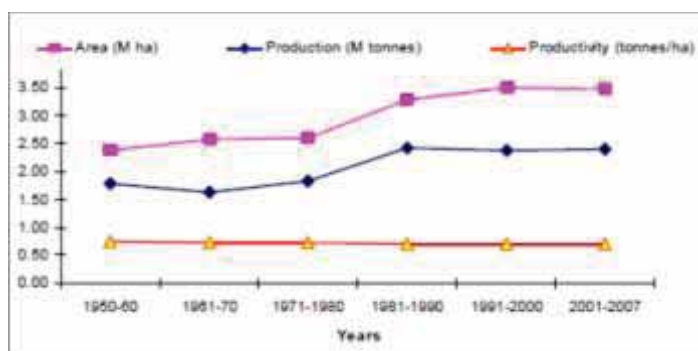
## Prospects of Nirmals Pigeonpea Hybrid

S. Y. Patil  
(Plant Breeder)

In the protein-rich group of crops, Red gram or Pigeonpea [*Cajanus cajan* (L.) Millsp.] Occupies an important place among rainfed resource poor farmers because it provides quality food, fuel wood, and fodder. Its soil rejuvenation qualities such as release of soil-bound phosphorous, fixation of atmospheric nitrogen, recycling of soil nutrients and addition of organic matter as well as other nutrients make pigeonpea an ideal crop of sustainable agriculture in the tropical and sub-tropical regions of India. India is the major pigeonpea growing country and it accounts for 38.10 lakh hectare area and 30.20 lakh tones annual production with productivity of 806 kg per hectare (Pigeonpea Annual Report, 2013-14).

### Why We Need Hybrids in Pigeonpea?

The pigeonpea area, production and productivity trends in India in last five decades showed that there was about 2% increase in the area per year but the yield levels were stagnated around 600-700 kg per hectare. The best remedy is to increase productivity by breaking yield plateau through development of hybrids.



(Source: Saxsena et.al 2010.)

### Constraints in Pigeonpea Production in India

1. Pigeonpea grown as rainfed and intercrop cultivation.
2. Pigeonpea Cultivation even in marginal soils.
3. Losses due to abiotic & biotic stresses.
4. Inadequate availability of quality seeds of high yielding varieties.
5. Low seed replacement ratio in Pigeonpea.
6. Lack of precise package of practices for yield maximization.
7. Lack of high yielding heterotic stable hybrids.

### Benefits of Hybrids :

- 1) Increase grain yield.
- 2) Enhance seedling vigour.
- 3) Reduced seed rates.
- 4) Greater drought tolerance.
- 5) Greater disease resistance.
- 6) Possibility of development of value added product i.e. Dal.

### Development of CMS Systems - a Breakthrough

The development of CMS became imperative. The strategy was to induce CMS by placing pigeonpea genome in wild cyto-

plasm through hybridization. Out of seven systems of sterile cytoplasm A2 and A4 systems have been found effective because of their stability under various agro-climatic zones, availability of good maintainers and fertility restorers.

### Nirmals Pigeonpea Hybrid

Nirmal Seeds developed CGMS based Pigeonpea hybrid NTH-77 by utilizing the A2 cytoplasm of wild species of *Cajanus scaraboides*. The hybrid showed yield superiority over local varieties and national check variety. It gave yield superiority of 35.96% over the national variety ICP-8863 (2030 kg/ha). The hybrid has acceptable seed size, maturity, tolerance to biotic-abiotic stress and it is also best suited under intercrop as well as gave highest yield advantage under sole crop.

### Characteristics of NTH-77 and check variety ICPL-8863 :

Sr. No.	Characters	NTH-77	ICPL-8863
1	Days to 50% flowering	110-115	115-120
2	Days to Maturity	155-160	165-170
3	No. of primary branches	16-18	12-14
4	No. of secondary branches	80-85	45-50
5	No. of pods/ plant	900-1000	700-800
6	100 seed weight	11.24	9.35
7	Yield (kg/ ha)	2760	2030



The hybrids represent a breakthrough in enhancing productivity in pigeonpea by focusing a heterosis and thus improving yield *per se*. The development of the CMS system in pigeon pea was a great achievement and has provided a platform for enhancing the pace of research and development of hybrid pigeonpea. The presence of high level of realized heterosis in farmer's fields has opened the way for commercialization of hybrid pigeonpea technology.



## Field evaluation of Nirmal's Bio fertilizer "Bhuparis RB" ( *Rhizobium spp* ) on Soybean

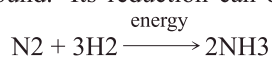
Vinayak Bhagat  
(Research Officer)

The increasing degradation of the soil fertility due to indiscriminate use of chemical fertilizers and pesticide particularly in India have gradually affected the soil quality in terms of physical, chemical, and biological structure and equilibrium. Which demand the development of alternative practices to minimize and mitigate those ill effects and to make Agriculture sustainable. Though for improving soil fertility and crop productivity the Integrated Nutrient management (INM) is one of the best options to maintain soil fertility status and to make Agriculture more economically viable. INM aim to reduce the use of chemical fertilizers, and to increase use of Bio inoculants, Organic manure and crop residue in farming system.

**Nirmal's Bio input division** is always engaged in development of eco friendly, efficient, and economical Bio product's useful for integrated crop management, organic farming, and residue free export oriented production of Agriproduct's.

**Nitrogen in Biosphere:** Nitrogen is the most abundant element atmosphere nearly 78% in the form of N<sub>2</sub> gas, nitrogen is essential component of proteins, nucleic acids and other cellular constituents. Nitrogen is not available in free form and be fixed (combined) in the form of ammonium (NH<sub>4</sub><sup>+</sup>) or nitrate (NO<sub>3</sub><sup>-</sup>) ions.

**Biological nitrogen fixation:** Species of *Azotobacter*, *Rhizobium*, *Azospirillum* have special mechanism to fix free Nitrogen into ammoniacal compound. The reduction of nitrogen gas to ammonia is energy intensive. It requires 16 molecules of ATP and a complex set of enzymes to break the nitrogen bonds so that Nitrogen can combine with hydrogen to generate ammoniacal compound. Its reduction can be written as:

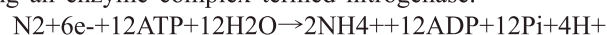


Fixed nitrogen is made available to plants by the death and lysis of free living nitrogen-fixing bacteria or from the symbiotic association of some nitrogen-fixing bacteria with plants.

***Rhizobium*:** *Rhizobium* is the most well known species of a group of bacteria that acts as the primary symbiotic fixer of nitrogen. These bacteria can infect the roots of leguminous plants, leading to the formation leg hemoglobin's pink colour nodules where the nitrogen fixation takes place. The bacterium's enzyme system supplies a constant source of reduced nitrogen to the host plant and the plant furnishes nutrients and energy for the activities of the bacterium.

**Nodulation Processes:** The initial interaction between the host plant and free-living rhizobia is the release of a variety of chemicals by the root cells into the soil. Some of these encourage the growth of the bacterial population in the area around the roots (the rhizosphere). Rhizobia can recognize their proper symbiotic partner by reactions between certain compounds in the bacterial cell wall and the root surface of legume species and subsequently infecting the root hairs by producing infection thread. After invasion of roots by *Rhizobia* division of Cortical cell occurs which results in formation of nodule tissue. Flavonoids secreted by the root cells activate the nod genes in the bacteria which then induce nodule formation. The whole nodulation process is regulated by highly complex chemical communications between the plant and the bacteria. *Rhizobia* fixes nitrogen which is transferred to plants cells in exchange for fixed carbon source.

**Enzymatic Mechanism of Nitrogen Fixation:** Biological nitrogen fixation is performed exclusively by *Rhizobium spp.* using an enzyme complex termed nitrogenase.



**Study of effect of Bhuparis RB (*Rhizobium japonicum*) on Soybean Crop:** Nirmal's culture bank have various strain of *Rhizobium spp.* In order to evaluate efficacy of strain and performance of bio inoculate experiment was conducted at Bohari Farm location of NSPL during July 2014. Bhuparis RB for Soybean was evaluated for nodule formation ability, Morphological character and Bio mass. Bio inoculants of *Rhizobium* species is extensively used for seed dressing. Bhuparis RB is recommended @ 500 gm per liter of water for 30 kg seeds of Soybean. During experiment following treatment were used.



T-1      T-2

### Treatment details:

- T 1 – Seeds treated with Nirmal's Bhuparis RB.
- T 2 – Control (Untreated)

**Observation Table :**

Sr. No.	Treatment	Shoot length (cm)	Root length (cm)	Shoot fresh wt. (g/plant)	Root fresh wt. (g/plant)	Shoot dry wt. (g/plant)	Root dry wt. (g/plant)	Nodule number/plant
1	T-1	8.2	10.9	16.3	19.8	8.0	9.5	21
2	T-2	6.6	7.3	14.7	13.4	7.2	6.9	13

**Result's:** The results of experiments reveals that, (T-1) Bhuparis-RB (*Rhizobium spp.*) shows improved root development, enhanced nodulation, which resulted in better nutrient uptake capability and increased nitrogen supply to the plant and hence biomass was also increased substantially as compared to (T-2) untreated control. Hence, we concluded that strains of *Rhizobium* for Soybean used in Nirmal's Bhuparis-RB (*Rhizobium spp.*) is effective and product can contribute for saving in Chemical nitrogenous fertilizer and retaining fertility status of soil. It could also be an eco-friendly alternative for reducing soil pollution caused by chemical fertilizers usage.



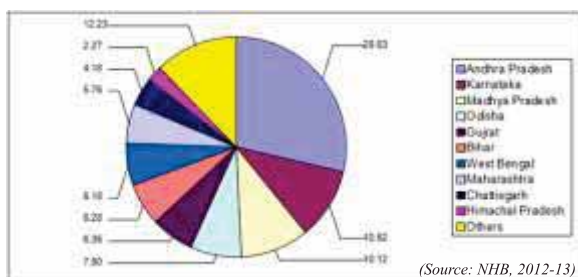
## Nirmal's Tomato: Catering needs of South Indian Farmers

B. P. Jadhav  
(Sr. Plant Breeder)

Tomato is the world's largest vegetable crop and known as a protective food both because of its special nutritive value and wide spread production.

Tomato ranks third priority after potato and onion in India but ranks second after potato in the world. The major tomato growing countries are China, USA, Italy, Turkey, India and Egypt. The total area under tomato in the world is 4582438 ha. with production of productivity of 32.8 tones/ha. There is sizable increase in acreage and production of tomato in India. There is an increase from 596000 ha. in 2006-07 to 879632 ha. in 2012-13 (Indian horticulture data base 2013).

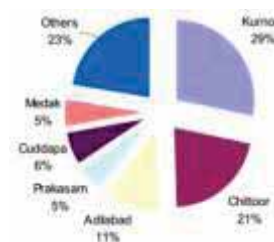
### Leading Tomato Producing States (2012-13) India



Tomato production in Andhra Pradesh stands second in production of tomato. Tomato is cultivated in about 260905 ha. with an production of 592620 tones with average productivity 20 tones/ha. The major tomato growing belts in Andhra Pradesh are Karnool, Rangareddi, Mehabubnagar, Prakasham, Vishakhapattanam & Chittur, Karnur is the largest tomato producing

district contributing more than 25% of states tomato production.

### District wise tomato production in Andhra Pradesh :



(Source: Department of Horticulture)

By considering the major tomato growing belts Nirmal Seeds Pvt. Ltd. gave more emphasis on to develop a suitable hybrid for this area. By keeping this view 56, different combination were screened for their response to the TLCV virus and yield production in Madanpalli area of Andhra Pradesh along with local checks. Among the 56 hybrids the hybrid NTH-2530 (29.8 tones/acre) out yielded over the all hybrids and local checks with very high degree of resistance to TLCV virus. NTH-2530 also got 35 Rs. more price/caret than the existing checks, due to its attractive deep red colour and good shipping quality. The another hybrid NTH-3072 (20.1 tones/acre) also gives more yield than the existing checks. The hybrid NTH-3072 has round firm fruits with green shoulder. Another hybrid NTH-3622 (20.22 t/acre) NTH-3615 (18.36 t/acre) also shows excellent performance in respect of virus tolerance and fruit quality.



NTH-3072 in Madanpalle.



NTH-2530 In Madanpalle.



NTH-2530 in Mallkacheru field.



NTH-3626 in Mallkacheru field.



NTH-3622 in Mallkacheru field. Dealer & Distributor visits to Malkacherru plot.





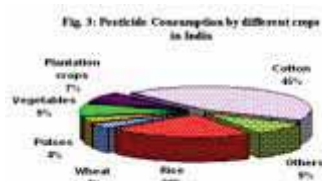
## Agriculture Biotechnology Need of 21<sup>st</sup> Century

Mayur Saindane  
(Research Assistant)

Man the most amazing and unpredictable creature of the God on the earth. He always prove himself in nature with his wings of wisdom by taking high fly from the deep depth of mysterious oceans to the undefined space near to the stars. 21st century is a door of future where man enters with power in one hand and knowledge in other. From the discovery of fire to the development of tremendously complicated space shuttle, the graph of his success is heightened, it is the ultimate truth that “need always gives birth to the inventions” In ancient times man had only three basic needs food, clothes and shelter and many of the inventions are the direct and indirect results of the attempts which man had made during fulfillment of these basic needs. As the time progressed he turns his search towards more specific and scientific techniques.

Food being a very basic need, there is always a positive flow of sciences and technology to meet the need of quality food. Agriculture involving domestication of plants and animals was developed around 10,000 B.C.E. History of Indian agriculture is also found to be oldest one it began by 9000 BCE as a result of early cultivation of plants, and domestication of crops and animals. Since time agriculture around the world is encountering many agro climatic challenges, today in this 21st century, Agriculture and particularly crop production, faces considerable pressure like Increase in the world population to more than 8.5 billion, limitations on available land and water resources, An apparent slowing in the increase in crop yields, Demands from consumers for cheaper and safer food and the need to sustain and improve the agricultural and surrounding environment.

The picture will become more horrible in next coming future ,some analytics result shows that by 2050 3% of Africa will no longer be able to produce Maize also with increase in population and change in diet 60% more food will be needed in 2050, use of pesticides affects natural habitat and lead to extinction of many ecologically important species .



(Source : Indian Journal of Agricultural Economics, 52(3): 488-498.)

Natural disasters are also raising the challenges for agriculture, Global warming leads to drastic change in temperature which results in increase in mean sea level. Droughts are affecting many areas especially in sub tropical and low mid latitude regions.



Mother nature has always with an answer to any question regarding with her most lovable child and she reveals her secret whenever we tried with honestly and passionately, it is only our intelligence that how we finds the secrets of nature. An Agricultural biotechnology is the result of efforts taken by many intelligent persons from last two decades. It is not single technology but it is a collection of scientific techniques used to improve plants, animals and microorganisms based on an understanding of DNA structure and function.

Genetic Engineering is one of the miracle by which the things come true which are possible only in fairy tells or in Hollywood movies up to the 19<sup>th</sup> century. Genetic engineering can pass the ability of one organism to other by insertion of genes. The process allows the transfer of useful characteristics (such as resistance to a disease) into a plant, animal or microorganism. Crops improved with transferred DNA (often called GM crops) to date have been developed to aid farmers to increase productivity by reducing crop damage from weeds, diseases or insects and insuring safe environment by reducing the use of pesticide and potentially harmful chemical. Knowing this fact Nirmal Seeds initiated efforts in recent past on development of transgenic Cotton in collaboration with Dow Agro science which uses Widestrike genes for development of insect resistance in Cotton. NSPL has also couple of collaboration with institutions like ICGEB (International Centre for Genetic Engineering and Biotech) and IARI (Indian Agricultural Research Institute) for development insect resistant transgenic crops like Okra, Pigeon pea and Tomato.

Molecular markers are the fantastic search engines by which we are able to find plants or animals that possess a desirable gene, even in the absence of a visible trait which makes breeding more precise and efficient. NSPL has developed Rice lines resistant to Bacterial Blight using genes (Xa21, Xa13 and Xa5) through use of marker assisted technology .This line will be further used for dvelopment of BLB resistant Hybrid Rice.

Biological process such as RNA interference (RNAi) in which RNA molecules inhibit gene expression, typically by causing the destruction of specific mRNA molecules becoming a valuable research tool, because synthetic ds RNA introduced into cells can selectively and robustly induce suppression of specific genes of interest. RNAi may be used for large-scale screens that systematically shut down each gene in the cell, which can help to identify the components necessary for a particular cellular process or an event such as cell division. More accurate diagnose of crop diseases can be done with help of Molecular diagnostics; Molecular diagnostics are methods to detect genes or gene products that are very precise and specific. RNAi Technology is being employed by NSPL for developing Yellow Vein Mosaic Virus resistant Okra. This programme is funded by Department of Biotechnology, Govt. of india through Public Private Partnership programme (BIPP). Mr. Gaurav Dhande, Head Biotechnology Division is the project investigator of this project.

It is supposed that the product delivered to farmers from this



project will be absolutely resistant to yellow vein mosaic virus.

The natural limitations due to environmental conditions and time factor can be overcome by technology like Tissue culture, in which regeneration of plants in the laboratory from disease-free plant parts is done which allows the reproduction of disease-free planting material of crops in large quantity within short time span. The crops such as citrus, pineapples, avocados, mangoes, bananas, coffee and papaya successfully develop and marketed by using this technique. Nirmal has its own capacity tissue culture lab where plants of Pomegranate are produced every year and available for farmers at cheapest cost. Main purpose of this facility is to provide farmer with disease free pomegranate plant lets.

Though we had made tremendous changes in agriculture world

by using our intelligence, the battle still goes on against natural as well as man made challenges.

In India Agriculture is not seen as a business only, but a culture which is most beautiful discovery of Indus civilization. In this 21<sup>st</sup> century Agriculture Biotechnology can become a hope and for which whole world is looking forward. Time has come where we must have to work with nature and technology hand in hand and change the way of thinking, that science is against the nature but it is an outcome of understanding the nature and use of the knowledge obtain from that understanding for welfare of nature and ultimately entire world, then, only Agriculture Biotechnology can help for survival and sustainability of this amazing gifts of ancient civilization.

## अनुभवाचे बोल....

श्री. शिवाजी विठोबा माळी

कुन्हाड खु. ता. पाचोरा



पाचोरा हे तालुक्याचे ठिकाण. पाचोऱ्यापासून अवघ्या १२ कि.मी. अंतरावर कुन्हाड खुर्द हे आमचं गाव आहे. आमच्या गावात शेतकरी मोठ्याप्रमाणात कापूस, मका, आणि मिरचीची लागवड करतात. कापूसामध्ये सर्वाधिक लागवड बी.टी.चीच केली जाते. कापूस लावण्याअगोदर मी विचार केला की, दरवर्षी आपण कपाशी लावतो परंतु अपक्षेप्रमाणे उत्पादन मिळत नाही. यंदा मनोमन ठरवलं की, काहीतरी वेगळं करून दाखवू. म्हणून मी माझ्या ८ एकर क्षेत्रामध्ये ९ जून रोजी बी. टी. कपाशीची लागवड केली. अनेक लोकांकडून मार्गदर्शन घेतले. तेव्हा अनेक प्रगतीशील शेतकऱ्यांनी निर्मलची जैविक उत्पादने वापरून कपाशीचे भरघोस उत्पादन घेतल्याचे निदर्शनास आले. त्याच प्रेरणेतून मी निर्मल सिड्सचे निर्मल बायोपॉवर, बायोसंजीवनी आणि बेरीलॉन (व्हाईट गोल्ड) ही जैविक उत्पादने विकत घेतली. त्यांचा शिफारसी प्रमाणे वापर केला. निर्मल बायोपॉवर (द्रवरूप) २ लि. प्रती ५०० लि. पाण्यात मिसळून टिबकद्वारे पिकाच्या मुळाभोवती दिले. त्याचा परिणाम भरपूर मुळ्या फुटण्यामध्ये झाला. केसाळ मुळ्यांचे प्रमाण वाढले आणि झाडे टवटवीत झालीत. त्यानंतर फुल व पात्या लागतांना बेरीलॉन (व्हाईट गोल्ड) १ मिली प्रती लिटर या दराने फवारणी केली. बेरीलॉनमुळे फुले पाती लवकर येवून बोंडे लागायला सुरुवात झाली. त्याचबरोबर होणारी फुल व पातेगळ कमी झाली. बोंडांची संख्या वाढली. कपाशीवर येणाऱ्या विविध जिवाणूजन्य व सुरक्षकृमीमुळे होणारी मुळकुज, मर रोगासाठी मी बायो संजीवनी हे जैविक बुरशीनाशक वापरले. झेंचिंगच्या माध्यमातून बायो संजीवनीच्या आतील पाकीटातून प्रत्येकी ५०० ग्रॅम कल्चर २०० लि. पाण्यात ५०० ग्रॅम गुळसोबत मिसळून झाडाच्या मुळाभोवती दिले. त्यामुळे लक्षणीय बदल झाल्याचे दिसून आले. रोगराईचे नियंत्रण झाले. अशा एकंदरीत सर्व परिणामामुळे कपाशीची वाढ उत्तम रितीने झाली. हे निरीक्षणाद्वारे मी अनुभवले.

माझ्या ८ एकर क्षेत्रामध्ये आतापर्यंत एकूण ८० क्विंटल कापूस निघाला आहे. पुढील फरदळीपासून एकूण २२ ते २४ क्विंटल उत्पादन मिळणार अशी मला खात्री आहे.







◆ **CMD & Director's visits**



QUT Deputy Vice Chancellor Professor Arun Sharma , Professor Sheel Nuna & Professor Bronwyn Harch with Nirmal's Board of Directors, discussion on project on Pigeon pea at Delhi.



Hon'ble CMD Mr. R. O. Patil, Hon'ble Director Mr. D. R. Deshmukh, AGM (Marketing) Mr. G. M. Patil observing the performance of Nirmal's Tomato NTH - 3104 at Nashik along with marketing team.



At the grape field : Use of Nirmal Bio Products



Hon'ble Director of Research Dr. J. C. Rajput explaining farm activities to Mr. Nibiyau, Mr. Aniruddha Shinde & Mr. Vijay Dayma at Ginchi, Ethiopia.



Hon'ble President (BH) Mr. Ashish Wele along with Hon'ble Director Research Dr. J. C. Rajput, Dr. Dermanto (Business Partner - Indonesia) and Dr. Paul (Business Partner - Korea) during presentation of Bio-Power to Dr. Suswono, *H.E.* Minister of Agriculture, Indonesia.



Hon'ble President (BH) Mr. Ashish Wele presenting the Bio Product's information to the Technical Sub Committee at Indonesia for their registration.



Hon'ble CMD's Speech at AgriBizz 2014 jointly organized by State Agriculture Universities of Maharashtra.



Hon'ble CMD, Hon'ble Director R&D & Hon'ble President (BH) visiting Paddy R&D at Shahapur, Thane.



◆ Eminent Guests



(R to L) Hon'ble Shri Ramdasji Kadam (Minister of Environment), Hon'ble Director Shri D. R. Deshmukh, Hon'ble S. S. Patil (AGM- F&A) and Mr. M. S. Paprikar (Microbiologist) at Nirmal Seeds.



Hon'ble Shri. Arvindbhai Sawant (MP).



Dr. Surinder K. Tikoo (Director Research Breeding & Development) Tierra Seed Science Pvt. Ltd., Hyderabad.



Dr. J. D. Supekar (Superintendent of Police) Jalgaon.



ISO Auditors from Mumbai.



Mr. Sambhaji Thakur, Project Director - Atma, Jalgaon visiting Jamun plantation at Anturli (Hon'ble CMD's farm).



Mr. N. V. Deshmukh (Sub Divisional Agril. Officer, Pachora) and Mr. B. D. Jade (Manager - Technical Services, Jain Irrigation) visiting Jamun plantation at Anturli (Hon'ble CMD's farm).



Dr. Alexander Sorokin, MD - Algentech - France, discussion on Algentech Collaborative project in Biotechnology with Board of Directors.



Dr. Warade and Board of Directors with students from Arunachal Pardesh.



Dr. Paul Park and Scientists from Korea.



Team of Dealers from Kenya.



Study tour of Govt. Officers from Odisha.



Progressive farmers from Odisha.



Farmers from Madhya Pradesh.



Students from Govt. Institute of Science College,  
Aurangabad.



श्री किशोर आप्पा पाटील हे प्रथमच आमदार झाल्यानंतर त्यांचा निर्मल परिवारातर्फे सत्कार करुन आशीर्वाद देताना निर्मल परिवाराचे प्रमुख श्री आर. ओ. पाटील, डॉ. एस. एस. पाटील, श्री डी. आर. देशमुख, डॉ. जे. सी. राजपुत, श्री एस. एस. पाटील व सर्व विभाग प्रमुख.



◆ Conference & Seminars

“Agroworld - 2014”



Participated in exhibition organized by “Agroworld & Agriculture Department” of Jalgaon.



Participation in 102<sup>nd</sup> Indian Science Congress in Mumbai University.



Mr. Valmik Patil and Kishore Patole (NSPL scientists) with Dr. G. M. Bagoi (Scientist G and Head A2k+ DSIR) and Dr. S. K. Khatter (Scientist D DSIR).



NSPL scientist explaining Dextrose base project during Indian Science Congress.



## 1<sup>st</sup> Biotech -Breeding Round Table Consultation at NSPL

Gaurav Dhande  
(Biotech Department)

Breeding and Biotechnology are the two fundamental pillars of modern agriculture. In the current scenario at seed industry there is an urgent need to transfer technology, exchange ideas and knowledge among the peoples of Biotechnology and Breeding fraternity to combat climate change situations and to breed climate smart crops for sustainable agriculture, on this backdrop Nirmal Seed had organized one day Biotech - Breeding Round Table Consultation. On 2<sup>nd</sup> Jan 2015 with the theme “Breeders Make the Agriculture Biotechnologist Nurture.”

The meeting started with precious words of Dr. J.C. Rajput (Director). All the Biotech and Breeding scientist actively participated in aforesaid meeting. Hon. Managing Director Mr. R. O. Patil, Dr. S. S. Patil (Director), Mr. D. R. Deshmukh, (Director) and Mr. Ashish Wele (President, Business Head) grace the meeting with their valuable presence.

Mr. Ashish Wele delivered presentation on management perspective which was the main attraction of this meeting. Mr. Gaurav Dhande and Mr. Milind Kulkarni had presentation on “Breeders concerns with Crop specific Challenges” and “Action plan and possible Biotech solutions” respectively. Outline of novel breeding techniques was presented by Mr. Pankaj Patil and Mr. N. D. Deshmukh.

Best Biotech-Breeding coordinated project awards were presented for appreciation of the work to Mr. Gaurav Dhande and Mr. Vijay Hande for the project entitled “Development of nutritionally improved Double low Mustard varieties having low Erucic acid and low Glucosinolate content using Marker Assisted selection Approach”.

Mr. I. S. Halakude and Mr. Ramdas Raut were also awarded for their significant contribution in the project entitled “Incorporation of *WideStrike* Gene Cry1Ac (Event 3006-210-23) and Cry1F (Event 281-24236) in Nirmal Cotton Parental lines using Back-crossing Breeding method”. Inspiring concluding remarks were delivered by Hon. MD Mr. R. O. Patil in which he not only shown his vision for organization but also encouraged the entire staff for initiation of novel projects.



## Successful Training at University Of Guelph, Guelph Canada.

Dr. Jeetendra Solanki (Business Executive) and Mr. Gaurav Dhande (HOD, Biotech Department, Nirmal Seeds) have successfully completed training on Microspore culture of Brassica napus. The training program was arranged from 3<sup>rd</sup> to 14<sup>th</sup> of Nov 2014 at Plant Agriculture Department in University of Guelph, Guelph, Canada. This training program was aid under one of the funded project of Nirmal Seeds entitled “Development of Nutritionally improved DL Mustard varieties having low Eurcic and low Glucosinolate content”.







ISTA Workshop on Seed Sampling and Quality Assurance in Seed Sampling - Bangalore.



From left Mr. Max Soepboer, Mr. Gerry Hall, Mr. Eddie, Mr. S. M. Bhale (Manager QA - NSPL), Dr. Jagadish.



ISTA Workshop on Seed Vigour - Bangalore.



From left Mrs. Pratima Patil (Sr. Executive NSPL), Ms. Mona Mohd, Mr. Hegade, Dr. Stan Matthews and Dr. G. V. Jagadish.





## Nirmal Seeds special initiative in hosting Technology Partner-Sponsored Parallel Session 3<sup>rd</sup> Global Sustainable Biotech Congress-2014

### Vision :

Academia and Private organizations are making new efforts to link research strengths of Public sector and Product Delivery Chain of Private sector for transfer of technology from lab to land for society and human welfare. On this back drop Nirmal Seeds Pvt. Ltd. in association with North Maharashtra University, Jalgaon has taken a step ahead to accomplish this motto by organizing Technology Partner-Sponsored Parallel Session under third Global Sustainable Biotech Congress – 2014 (GSBC) organized from 1-5<sup>th</sup> December 2014 at North Maharashtra University, Jalgaon. The theme of the conference was to accommodate all types of scientific activities relevant to life sciences contributing towards sustainable development.

### Background :

When two individual meet and reacts, transformation starts. Technology Partner-Sponsored Parallel Session is no exception to this phenomenon. Prof. V. L. Maheshwari, Director School of Life Sciences, North Maharashtra University, Jalgaon had a formal meeting with Mr. Ashish Wele, and Mr. Gaurav A. Dhande, Head-Biotech Division, Nirmal Seeds Pvt. Ltd. The genesis of this event started there itself, the event was well supported by management of either sides i.e. Board of Directors of Nirmal Seeds Pvt. Ltd. Pachora and Hon. Vice Chancellor, NMU, Jalgaon. NSPL has shown strong willingness to sponsor and organize a parallel session of GSBC-2014 at NSPL, Pachora.

### About Technology Partner-Sponsored Parallel Session :

Nirmal Seeds had organized Technological Partner –Sponsored Parallel Session on 3<sup>rd</sup> December 2014. The session started with welcome remarks delivered by Mr. Mayur Saindane. The entire session was hosted by Miss Trupti Chavare studying in 7<sup>th</sup> Std. and Sakashi Shisodiya studying in 8<sup>th</sup> Std. at Nirmal international School, Pachora which was the pleasurable attraction of this event.

Professor Sagadeven Mundree, Deputy Director, Centre for Tropical and Biocommodities of Queensland University of Technology, Australia inaugurated this event. All the invited Dignitaries, Honorable Board of Directors, Nirmal Seeds and participated scientists lightened the lamp. The Gayatri Mantra recited during lightening created highest vibrations of positive energy and a zealous environment.

### Inauguration Ceremony :



Mr. R. O. Patil, Mr. D. R. Deshmukh, Dr. S. S. Patil, Dr. J. C. Rajput and Mr. Ashish Wele respectively honored Professor Sagadevan Mundree, Dr. Nutan Kaushik, Prof. I. Dasgupta, Dr. Neera Sarin and Dr. S. B. Tripathi. Core of this session started with the technical presentations.

### Technical session :



Mr. Ashish Wele (President, NSPL) started this session with review about Nirmal Seeds including brief explanation about mandate, infrastructure, and International Business and HarvestPlus program.

Mr. Gaurav Dhande (Head, Biotech Division, NSPL) started his presentation by introducing the young team of researchers working in Biotech division. His presentation focused on current scenario of research at biotechnology division of Nirmal Seeds. In his presentation, he briefly explained about the projects funded under Public Private Partnership Programme VIZ. Development of Nutritionally improved double low Mustard varieties/hybrids, Development of viral resistant Okra, Development of insect resistance BT Cotton, Development of BLB resistance Rice, and Pomegranate Micro propagation.



Afterwards honorable and invited Excellencies presented their research achievements. Prof. Sagadeven Mundree (Deputy Director of Queensland University of Technology, Australia) presented about the partnership of Queensland University of Technology with Nirmal Seeds Pvt. Ltd. He briefly explained about the need of partnership, targeted research areas, etc. Hon. R. O. Patil presented a memento to Prof. S. Mundree.



Prof. S. Mundree presenting about QUT- NSPL partnership.



Hon. R. O. Patil presenting memento to Prof. S. Mundree.

Prof. Nutan Kaushik (TERI, New Delhi) is one of the collaborating partners of Nirmal Seeds. Her research presentation focuses on Quality improvement and bioactivity of Brassica species.



Prof. Nutan Kaushik presenting her research activities



Hon. D.R. Deshmukh presenting memento to Prof. Kaushik

Prof. Indranil Dasgupta (UDSC, New Delhi) briefed about engineering Viral resistance in Okra. He is associated with Nirmal Seeds for development of Viral resistant Okra under BIPP programme of DBT.



Prof. Indranil Dasgupta presenting his research activities.



Hon. Dr. S. S. Patil presenting memento to Prof. Indranil Dasgupta.



Dr. Shashi Bhushan Tripathi (TERI, New Delhi) presented about his research achievements. Dr Tripathi is working in association with Nirmal Seeds for Development of nutritionally improved double low Mustard varieties/hybrids. His presentation was entitled as “Marker assisted breeding for quality traits in Brassica”.



Dr. S. B. Tripathi presenting his Research activities.



Hon. Ashish Wele presenting memento to Dr. S. B. Tripathi.



Hon. R. O. Patil presenting memento to Prof. Neera Sarin.



Hon. J. C. Rajput presenting memento to Prof. V. L. Maheshwari.

**Concluding Remarks :**

This mega event organized by Nirmal Seeds has not only created diverse horizons for the scientist community but also initiated the wave of enthusiasm of working passionately for farmers, agriculture, society and ultimately nation.



From left Mr. Ramdas Raut, Mr. Gaurav Dhande, Prof. Dr. Sudhir U. Meshram (Vice Chancellor - NMU), Prof. V. L. Maheshwari, Dr. P. R. Puranik and Prof. A. G. Ingale.



“4<sup>TH</sup> INTERNATIONAL RICE CONGRESS 2014”



Mr. A. B. Birajdar participated in the 4<sup>th</sup> International Rice Congress, held during 27<sup>th</sup> October to 1<sup>st</sup> November 2014 at Bangkok, Thailand. “Rice for the World” was the theme of the congress where in 1500 Researchers from 64 Countries participated in this global event.

◆ **New Joinings**



**Murlidhar M. Khalate**  
Sr. Manager - F/S  
H.O.



**Ramchandra D. Bedse**  
Agronomist  
H.O.



**Mukesh B. Patil**  
Plant Breeder  
H.O.



**Anupam K. Bhatnagar**  
Area Sales Manager  
Lucknow



**Prabhakar Sharma**  
Area Sales Manager  
Durg



**Nation Chamling**  
Technical Officer  
Gangtok

◆ **Twinkling Stars & Wedding Bells**



Miss. Kaveri N. Jadhav  
Merit Scholarship Scheme  
Exam Pass - 2013-14.



Master. Mayur V. Thakre  
Scholarship  
Exam Pass - 2013-14.



Chi. Sau. Kan.  
**Namrata**  
D/o. Vilasrao Dhande  
With  
**Chi. Praful**  
S/o. Vinodrao Deshmukh  
on **18<sup>th</sup>** December 2014.



## निर्मल इन्टरनॅशनल स्कूल

### मुलांना केवळ स्पर्धेसाठी तयार करू नका....



“पालकांना जे वाटतं तेच लहान मुलांनी करावं ही अपेक्षा ठेवणं मुळातच चुकीचं आहे. मुलांना मुल म्हणून जगू द्यावं ते हिरावून घेवू नये. त्यांचं व्यक्तिमत्व स्वतंत्र आहे. त्यांचं भावविश्व वेगळं आहे. त्यांना स्वतःची ओळख आहे. त्यांच्यावर कोणतीही गोष्ट लादू नका. मुलांच्या अपेक्षा जाणून घेत नाही. त्यांच्यावर अपेक्षांचं ओझ लादतो. प्रत्येक पालकाला वाटते की माझा मुलगा डॉक्टर किंवा इंजिनियरच बनला पाहिजे. म्हणून सगळ्यांना एकाच साच्यात घालून तयार करतो ते योग्य नाही. त्याला स्वतःला त्याचं क्षेत्र निवडू द्या. माझं क्षेत्र मी स्वतः निवडेल आणि त्यामध्ये मी एक्सलंस असेल असं प्रत्येक मुलाला वाटलं पाहिजे. मुलांना केवळ स्पर्धेसाठी तयार करू नका. त्यांच्या सृजनशीलतेला वाव दिला पाहिजे. तरच मुले निकोप पणे घडतील. स्वतःमध्ये असलेल्या अफाट शक्तीचा जेव्हा मुलांना साक्षात्कार होईल तेव्हा कोणी उत्तम कवी होईल, कोणी वक्ता होईल, कोणी नामवंत संगीतकार होईल, कोणी प्रख्यात चित्रकार होईल, कोणी तत्ववेत्ता होईल तर कोणी जगविख्यात शास्त्रज्ञ होईल.”



बंधनांचे गज तोडुनी गाऊ मुक्त गाणे  
दप्तरांचे ओझे विसरुनी क्षणभर खेळु धुंदीने...  
ताल सुरावर धरला जुना फेकुनी नव्याने  
रुमझुमती-थरथरती अमुच्या पायातील पैजणे...  
कविता भरु तोंडी उलटुनी भराभर पाने  
निसर्गाची अम्ही फुले दरवळु स्नेह अमृताने...  
इथे विर्घळले सारे जीव बंधुभाव एकतेने  
झेप घेवु नवी आता गरुडाच्या पंखाने...  
माणुस बनुनी दाखवु अम्ही मरुनी अनंत मरणे  
तिरंगा घेवुनी खांद्यावरती अमुचे देशासाठी जगणे...



## ◆ Product Performance

### Excellent performance of Hybrid Chilli NCH-648 in Karnataka.

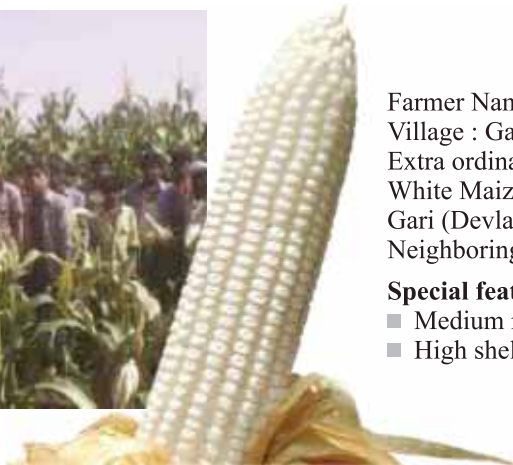


Farmer Name : Hanam Reddy Ramreddyer  
 Taluka - Panchyat Member, R/o - Hyati, Taluka & District - Koppal (Karnataka)  
 Mob: 09945871807.

#### Remarks :

It is very high yielding & vigorous growing hybrid, suitable for red chilli purpose.  
 Fruits are attractive dark red at maturity. Wrinkled fruit surface with good pungency.  
 It has good red colour retention and highly tolerant to PM disease.

### Outstanding performance of hybrid White Maize NWMH - 27.



Farmer Name : Mr. Shintu, S/o. Jugadiya Jamre  
 Village : Gari (Devla), Taluka - Bistain, District - Khargaon.  
 Extra ordinary performance of Nirmal's single cross  
 White Maize - hybrid NWMH - 27 at farmer field of village  
 Gari (Devla) during Kharif - 2014.  
 Neighboring dealers & distributors and farmers visited the field.

#### Special features :

- Medium maturity (100-110 days) ■ Semi flint, white bold grains
- High shelling percentage ■ High yielding hybrid.



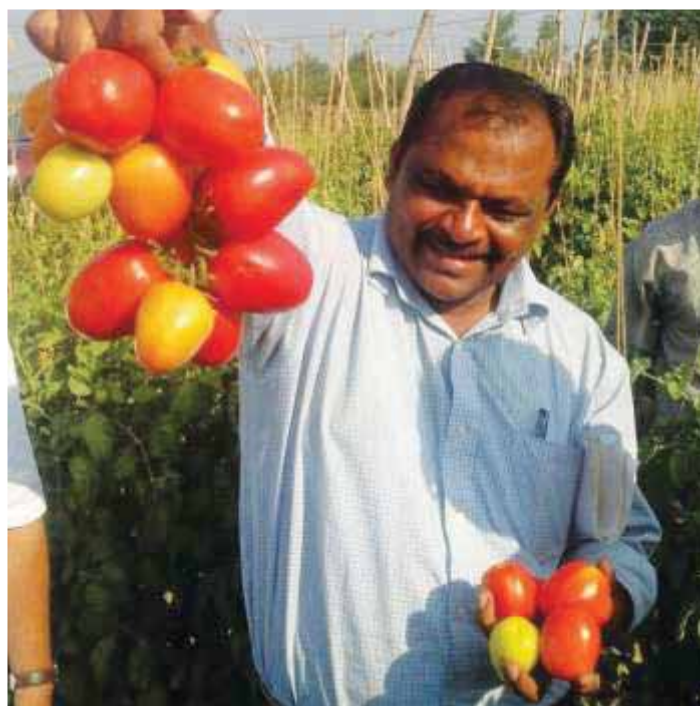
### Use of Bio-Power (Granules & Liquid), Bio Sanjivani and Bio Kit for Ginger.



Farmers Name : Someshwar Karbhari Tadhe  
A/p. Devpul  
Taluka - Kannad, District - Aurangabad

**Remarks :**

The crop is dark green in colour, tender crop, disease infestation is negligible & root system development is very good. The use of these Bio products has shown encouraging results on yield, quality & growth parameter of Ginger.



### Performance of Nirmal's hybrid Tomato NTH-3104.

Mr. B. P. Jadhav (Sr. Scientist - Vegetable) showing the performance of Nirmal's hybrid tomato NTH-3104 at the farmers field (Nashik).

**Features :**

- Average fruit weight is 80-90 gms and fruit is oblong in shape and very firm.
- Fruit colour is dark red with excellent keeping quality.
- Plant growth is semi indeterminate.
- It is highly tolerant to blight and TyLCV disease.
- It has very good yield potential and suitable for kharif & rabi cultivation.





### Extraordinary performance of Pea NP - 20 in Jharkhand



Farmer Name : Mr. Chandra Veer Uranv. Village - Bajpur Road (Near Rice Mill) Ratu, District - Ranchi.

### Excellent performance of Bajra NPH - 1651 and NPH - 4506



Mr. Dineshwar Giri - Regional Manager, Punjab along with farmers at field of hybrid Bajra NPH-1651 & NPH-4506.

### Performance of Paddy NPH - 242 in Bihar



Farmer Name : Mr. Anil Mandal. Village - Nima, District - Jamui (Bihar)



**Mr. Narendra Suryawanshi (Executive Business Development), Mr. Kale (Production Manager), Mr. B.P. Jadhav (Sr. Plant Breeder) and Mr. Pattar (RM-Production) during their field visit to seed production plots.**



### Field performance of hybrid Okra NOH - 1648 in Gujarat State.



Farmer Name : Mr. Bhagubhai Ramanbhai Patel  
 Village : Pati (Mandir faliya), Vyara, Gujarat. Mob.: 09727090732.  
 Sowing date : 23-09-2014. No. of pickings : 30.  
 Exported to : London.

#### Feedback :

- Field is totally free from YVMV incidence.
- Internodes distance is less and fruiting appears in parallel manner.
- Picking of fruit is easy.
- Fruit is straight, long and shiny with blocky shape.
- Due to its export quality it has fetched premium price in the market.



### Bumper yield of hybrid Brinjal NBH - 1001



Location : Anturli, Taluka - Pachora, District - Jalgaon (MH).  
 Plant population : 6460.  
 Spacing : 5 ft x 2 ft.  
 Sowing date (Nursery) : 30th July 2014.  
 Transplanting date : 15th September 2014.  
 Fertilizers : FYM, Bio-Power granules, Bhuparis, Neem cake.  
 Marketed to : Surat (Gujarat), Mumbai, Malegaon, Local (MH).

#### Features :

Growth habit : Semi erect  
 Fruit colour : Shiny purple with green calyx  
 Fruit shape : Oblong big  
 Av. fruit wt. (g) : 200 - 220

- Big oblong fruit with green calyx
- Good colour retention
- High yielding hybrid.



## निर्मलच्या जैविक उत्पादनांमुळे झाले द्राक्ष पिकाचे उत्तम पोषण

राज्यात प्रामुख्याने नाशिक, सांगली, सोलापूर आणि पुणे जिल्ह्यात द्राक्षाची लागवड मोठ्या प्रमाणात केली जाते. परंतू आज विदर्भ आणि मराठवाड्यातही द्राक्षाची शेती विस्तारलेली आहे. राज्यातील द्राक्ष उत्पादन देशात प्रथम क्रमांकावर आहे.

राज्यातील बागायतदार शेतकऱ्यांनी निर्यातक्षम द्राक्षे पिकवून युरोपच्या बाजारपेठेमध्ये आपली ओळख निर्माण केली. द्राक्ष पिकाने शेतकऱ्यांना आर्थिक संपन्नता प्रदान करून देशाला कोट्यवधी रूपयांचे परकीय चलन मिळवून दिले. म्हणूनच शेतकरी द्राक्ष या नगदी पिकाला जीवापेक्षाही जास्त जपून त्याची काळजी घेतात. अशाच काही शेतकऱ्यांनी द्राक्ष घडांच्या वाढीसाठी, घडांच्या पोषणासाठी, द्राक्ष मण्यांचा आकार वाढविण्यासाठी आणि रोग व किडींच्या प्रतिबंधासाठी निर्मलच्या जैविक उत्पादनांचा वापर करून त्यांना खालीलप्रमाणे फायदा झाला आहे.

\* डाऊनी व बुरशीजन्य रोगांचे चांगले नियंत्रण झाले. \* द्राक्ष घडांच्या पाकळ्यांमध्ये सूटसूटीत पणा व लवचिकपणा मिळाला.

\* द्राक्ष घडांच्या पाकळ्यातील अंतर व लांबी चांगल्या प्रकारे मिळाली. \* द्राक्ष मण्यांची फूगवण झाली.

\* रासायनिक खतांचा खर्च ५०% ने कमी झाला.



सदाशिव कारभारी ढोमसे, मु.पो.गोरठाण ता.निफाड जि.नाशिक



रणजित दशरथ झेंडफळे, मु.पो.चिंचखेड ता.दिंडोरी जि.नाशिक



भुपेंद्र पंडितराव निखाडे, मु.पो.वडनेर (भैरव), ता.चांदवड जि.नाशिक



श्री किसनराव नाना कदम, मु.पो.कोराटे ता.दिंडोरी जि.नाशिक



श्री विकास रामदेव कदम, मु.पो.कोराटे ता.दिंडोरी जि.नाशिक



श्री राजेंद्र कदम, मु.पो.कोराटे ता.दिंडोरी जि.नाशिक



### Performance of Paddy hybrid N-242 in multilocation trial

Hybrid rice is the proven technology for increasing rice production and productivity and with good management, yield advantage of 1.0 to 1.5 t/ha can be obtained by cultivation of hybrids as compared to the high yielding varieties under the same set of growing conditions. It is playing an important role in increasing the rice production in our Country and appreciable progress has been made in the hybrid rice research and development. As a result of intensive research efforts made over the last 25 years, 70 hybrids i.e, 31 of public sector and 39 of private sector with high yield potential and better grain quality have been released for commercial cultivation. About 30-35 of them are in the active seed production chain and by encouraging the cultivation of these hybrids in the Country, rice production and productivity can be further improved. Hybrids play important role in food security mission.

The multilocation trial of paddy hybrid N-242 were given at different locations of eastern region (Jharkhand, Bihar, Madhya Pradesh & Uttar Pradesh) & western region (Gujrat) during Kharif-2014. The hybrid shown best performance in field with mid-early maturity (125-130 days), more number of productive tillers per plant, more number of spikelets per panicle, high yield & shown high tolerance to major pest & diseases. Therefore, the farmers are more happy with good response of N-242 as compared to other market hybrids.

#### *Special features of Paddy Hybrid N-242*

- Mid-early duration (125-130 days)
- Long slender non scented grains
- More number of productive tillers per plant
- High yielding hybrid & excellent cooking quality
- Highly tolerant to major pest & diseases.





## ◆ Success Story

### खडक फोडून काढली गोड रसाळ फळे



**शे**तीसाठी जमीन कशी असावी असा प्रश्न जर कोणी विचारला तर त्याचं उत्तर सुपीक आणि कसदार जमीन ! परंतु जिथे माती ऐवजी चक्क खडकांनीच भरलेलं रान आहे आणि तिथे पिकवून दाखवा



असं म्हटलं तर कुणालाही हसू आल्याशिवाय राहणार नाही. कारण दगडधोंड्यांच्या पिकाशिवाय अन्य दुसरं कोणतंही पिक घेता येणार नाही. या धारणेतून पिक घ्यायला कोणताही शेतकरी तयार होणार नाही. कारण वर्षानुवर्षे शेतीच्या अनुभवातून आलेलं ते शहाणपण असतं. परंतु याच शहाणपनाला आणि धारणेला ज्यांनी छेद दिला, त्यांनी अशा मोठमोठ्या दगड, खडकांवर चक्क बाग फुलवून आदर्श घालवून दिला.

पाचोरा तालुक्यातील अंतुर्ली (खडकी) हे गांव ! त्या गावाशेजारी खडकांनी भरलेलं एक शिवार ! जिथे फक्त दगडांचा पक्का रस्ताच होऊ शकतो... शेती नाही अशी सर्वच खानदानी शेतकऱ्यांची पक्की धारणा ! परंतु ही धारणाच ज्यांनी खोटी ठरवली, त्यांनी अशा खडकाळ आणि ओसाड जमिनीत नजर लागेल अशी डाळींबाची बाग फुलवली ते शेतकरी आहेत श्री तात्यासाहेब आर.ओ.पाटील ! हाडाचा शेतकरी म्हणून ही त्यांची पहिली ओळख तर निर्मल सिडस्चे चेअरमन तथा व्यवस्थापकीय संचालक ही त्यांची दुसरी ओळख !

तात्यासाहेबांनी चक्क खडकाळ आणि बंजर जमिनीमध्ये जिथे काहीच पिकणार नाही अशी जमिन विकत घेतली. मशीनने खडक फोडून तिला शेती योग्य बनविले. अशा खडकातून त्यांनी गोड व मधुर अशी रसाळ फळे निर्माण केलीत. ही सृजनशिलता कोतून आली तर त्यांच्या परिपक्व विचार गर्भातून आणि सातत्यपूर्ण प्रयोगशिलतेतून ! सलग २० एकर क्षेत्रामध्ये डाळींबाची लागवड करून उतीसंवर्धीत भगवा जातीच्या रोपांची बाग उभी केली. यापूर्वीही त्यांनी अशाच खडकावर ४० एकर डाळींबाची बाग फुलवली आहे. श्रमाचं खत घातल्याशिवाय यशाचा पारिजात फुलत नाही. या २० एकरामध्ये एकूण ६५७७ झाडे असून ती गर्द भगव्या रंगाच्या फळांनी लदबदलेली आहेत. त्यांनी ठिबक सिंचनाचा वापर करून कमी पाण्यावर ही सर्व झाडे पोसली आहेत. सेंद्रिय



शेतीच्या तत्वाला प्राधान्य देऊन उतीसंवर्धित झाडाच्या संगोपनासाठी आधुनिक तंत्रज्ञानावर आधारीत निर्मलच्या जैविक उत्पादनांचा वापर केला. यामध्ये डाळींब बागेच्या व्यवस्थापनासाठी निर्मल बायोपॉवर, निर्मल बायोफोर्स, बेरीलॉन, बायोसंजीवनी, गारनेट, मारवेल, जास्पर, एम्रल्ड, ट्रायडेंट तसेच बायोकिट या उत्पादनांचा वापर करून दर्जेदार फळांची बाग उभी केली. उत्तम प्रकारे पोषण झाल्यामुळे फळे मोठ्या आकाराची असून त्यांची काढणी सुरु आहे. मुंबई व नाशिकच्या बाजारात त्यांना चांगला भाव मिळत असून २० एकरामध्ये तात्यासाहेबांनी भरघोस उत्पादन घेतले आहे. दुरदृष्टी, नाविण्याचा ध्यास, प्रयोगशिलता आणि शेतीची उपासना यामुळे तात्यासाहेबांनी यशस्वी शेती करून एक आदर्श उभा केला.



“ स्वतःला झोकून दिल्याशिवाय शेती करता येत नाही. शेतीशी संबंधीत नवनविन तंत्रज्ञानाचा अभ्यास करून त्याचा अवलंब करण्यासाठी माझा सतत प्रयत्न असतो. पारंपारीक शेती करण्याचा जमाना आता राहिलेला नाही. आधुनिक तंत्रज्ञानाची कास धरूनच शेतकऱ्यांनी काळासोबत चाललं पाहिजे. ”

- श्री. आर. ओ. पाटील



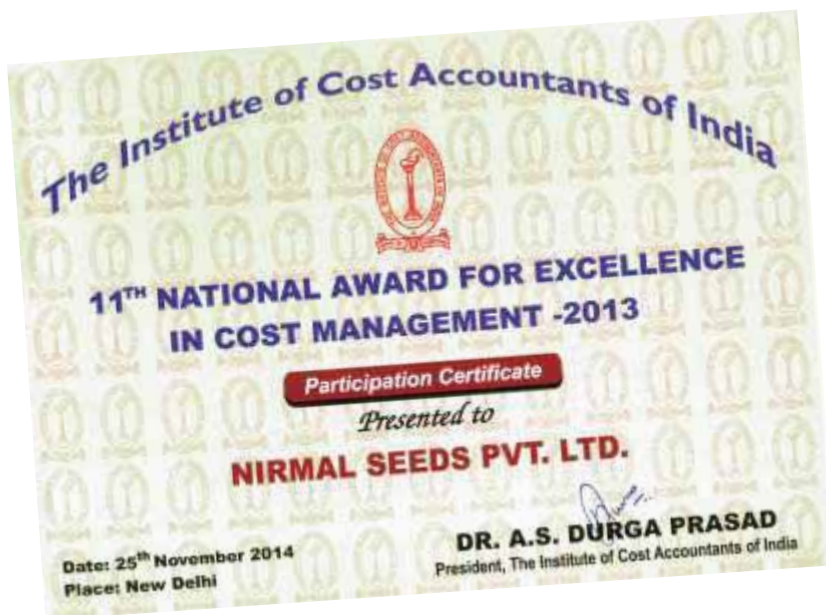
## निर्मल बायोपॉवर मुळे ऊसाचे एकरी १०१ टन उत्पादन



हातकणंगले तालुक्यातील रूकाडी या गावातील प्रगतीशील शेतकरी श्री महावीर भुजी कोल्हापुरे यांची ३९ गुंडे शेती. शेतीतील नवनवीन तंत्रज्ञान जाणून घेण्यासाठी आणि आपल्या शेतीत त्याचा अवलंब करण्यासाठी महावीर कोल्हापुरे हे अग्रेसर आहेत.

त्यांनी आपल्या ३९ गुंट्यामध्ये उसाची लागवड केली. लागवडीनंतर एक प्रयोग म्हणून त्यांनी निर्मल बायोपॉवर हे जैविक भुसंवर्धक वापरले. निर्मल बायोपॉवर हे भारत सरकार कडून प्रोसेस पेटेंटेड असून त्याच्या वापरामुळे उत्पादनात वाढ होते हे त्यांनी ऐकले होते. म्हणून त्यांनी निर्मल बायोपॉवर – २० किलो प्रति एकर या प्रमाणात लागणीच्या वेळी दिले. त्यानंतर बांधणीच्या वेळी निर्मल बायोपॉवर – २५ किलो प्रति एकर वापरले त्यानंतर त्यांना उसाच्या वाढीमध्ये लक्षणीय फरक दिसू लागला.

फुटव्यांची संख्या वाढून फुटवे एकसमान व चांगले मिळाले. पेऱ्यांची संख्या वाढून कांडीची जाडी व लांबी वाढली. उसाची उंची वाढली त्याचबरोबर पानांची लांबी व रुंदीही वाढली. ऊस चांगल्या वजनाचा तयार झाला. ऊसामध्ये साखरेचे प्रमाण वाढले. निर्मल बायोपॉवरमुळे ताण सहन करण्याची शक्ती वाढून रोग प्रतिकारक क्षमता वाढली. रासायनिक खतामध्ये बचत झाली. शेवटी ३९ गुंट्यामध्ये ९९ टन अर्थात एकरी १०१ टन इतके उत्पादन मिळाले.



Nirmal Seeds has participated in the 11<sup>th</sup> National Award for Excellence in Cost Management - 2013 organized by “The Institute of Cost Accountants of India” (Statutory Body under an Act of Parliament).

S. C. Gupta, Director - Administration (ICAI) appreciated our major achievements relating to cost management. He has also appreciated the maturity level of cost management practices resulting in better cost effectiveness and improved operational performance of the company. !!!





### National Symposium on “ECM” Technology for Safe, Secure and Profitable Food Production.



Mr. Kishore Patole (Plant Pathologist) & Mr. Valmik Patil (Research Officer) received 3<sup>rd</sup> prize for Poster Presentation during a National Symposium on “ECM” Technology for Safe, Secure and Profitable Food Production held at GBPUA & T Pantnagar, Uttarakhand.

### Remarkable initiatives by Nirmal Seeds for development of disease resistant crops.

Gaurav Dhande  
(Biotech Department)

Nirmal Seeds always has an active involvement in development of new varieties of the conventional crops for the fulfillment of farmers need. Knowing the fact that bacterial, fungal and viral diseases are the drastically affecting factors on the crop production in Indian sub-continental region and contributed lions shear in per year losses, Nirmal has taken initiatives for resolving this major problem in agriculture.

Recently Nirmal has started different programs in which disease resistant varieties of crops will be developed by using technique called MAS (Marker Assisted Selection). Rice, Tomato and chilli are the focused crop, for this program. Pyramiding of Bacterial Blight and Blast disease resistance genes in Nirmal’s Rice hybrids will be done by using Marker Assisted Selection.

Directorate of Rice Research, Hyderabad will provide support for introgression BLB resistance genes i.e. Xa21, Xa33 and Blast resistance genes i.e. Pi54, Pi2 in Nirmal’s Rice Hybrid.

Another two programs are likely to be commencing for development of TylCv resistant Tomato with 6 different genes responsible for TylCv resistance; this work will be done jointly by Nirmal seeds and Tierra seeds science, Hyderabad. The later programme includes development of Anthracnose resistance Hybrids in Chilli in collaboration with Scientist Dr. Jae Bok Yoon from Seoul National University, Sunvon, Korea.



Bacterial Blight Disease Resistant.



Bacterial Blight Disease Susceptible.



## ◆ Felicitation of New Ministers of Maharashtra

उत्तरदायित्वों को सुहृदयता से संभाल कर 25 सालो से किसानों की निरंतर सेवा करनेवाले किर्तीमान भुमीपूत्रों ने खान्देश नगरी में खुशहाली का बीज बोकर किसानों के चेहरों पर मुस्कान लायी । केवल समाजहित के लिए ही राजनीति से नाता जोडकर निर्मल सीड्स के माध्यम से किसानों को समृद्ध बनानेवाले निर्मल परिवार के अध्यक्ष एवं प्रबंध निदेशक श्री तात्यासाहब आर. ओ. पाटील, डॉ. जे. सी. राजपुत (निदेशक), डॉ. एस. एस. पाटील (निदेशक) एवं श्री डि. आर. देशमुख (निदेशक), महाराष्ट्र के मंत्रिमंडल के नये मंत्रियों का स्वागत करते हुए...



मा.श्री.रामदासजी कदम  
(कैबिनेट मंत्री - पर्यावरण)



मा.श्री.सुभाषजी देसाई  
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मा.श्री.दिवाकरजी रावते  
(कैबिनेट मंत्री - परिवहन)



मा.श्री.गिरीशजी महाजन  
(कैबिनेट मंत्री - जलसंसाधन)



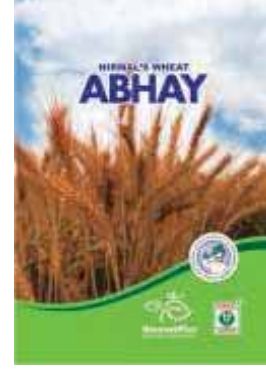
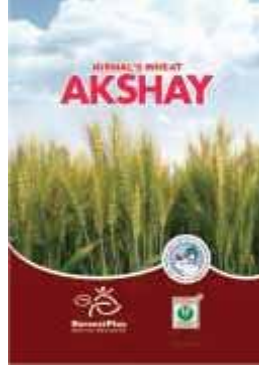
मा.श्री.डॉ.दिपकजी सावंत  
(कैबिनेट मंत्री - स्वास्थ्य एवं परिवार कल्याण)





## BusinessLine

At your kirana shop soon: Zinc-rich rice, wheat



Enriched grains The Consultative Group on International Agricultural Research has taken up the initiative of bio-fortifying seven food crops, including wheat, rice, pearl millet and maize, through its initiative HarvestPlus.

India looking at bio-fortified crops to tackle malnutrition, allocates \$40 million for development

CHENNAI, APRIL 17:

If efforts of scientists and global organisation working on nutritional health yield results, you will soon be able to buy zinc-rich rice or wheat or even iron-rich millet or maize (corn).

India is looking at the option of administering nutrition through crops, especially when millions of children in the country are suffering from malnutrition and under-nourishment.

According to MS Swaminathan, Director of MS Swaminathan Research Foundation, India tops globally in the number of children whose growth has been stunted.

"Growth of 61.7 million children has been stunted in India," he told the second global conference on Biofortification in Kigali, Rwanda, recently.

The seriousness of the Indian situation can be gauged from the fact that Nigeria is a distant second with growth of 11 million children stunted.

According to Chris Elias, President, Global Development Programmes, Bill and Melinda Gates foundation, India has endorsed the use of nutrient-rich crops.

**According to Nirmal Seeds, the Indian firm which is working in Africa in development of iron-rich pearl millet, it is engaged in developing high zinc wheat in India.**

*(This article was published on April 17, 2014)*



सततचा दुष्काळ, नापिकी आणि कर्जबाजारीपणामुळे महाराष्ट्रातील अनेक शेतकऱ्यांनी शेवटचा मार्ग म्हणून आत्महत्येचा मार्ग पत्करला.

घराचा आधार कोसळल्यानंतर संसारच उघडा पडला. अशा कठीण परिस्थितीमधून जीवनाची वाट शोधणारी ही निरागस मुले....

पंखांना उडण्यासाठी बळ मिळावं, त्यांनी खंबीरपणे उभं रहावं आणि निर्धाराने पुढे जावं यासाठी निर्मल सिड्सला दिलेली भेट आणि त्याभेटीतुन निर्मल मनाने साधलेला उभारी देणारा संवाद !