कार्यकारी सारांश

फसल सुधार

अखरोट के उपज तथा गिरी गुणवत्ता में उन्नत पाये गये पाँच जननद्रव्य क्रमशः सी.आई.टी.एच. अखरोट-1, सी.आई.टी.एच. अखरोट-2, सी.आई.टी.एच. अखरोट-3, सी.आई.टी.एच. अखरोट-4, तथा सी.आई.टी.एच. अखरोट-5, तथा खुबानी में उत्पादकता एवं फल गुणवत्ता में उन्नत तीन जननद्रव्य क्रमशः सी.आई.टी.एच. खुबानी-1 ,सी.आई.टी. एच. खुबानी-2, सी.आई.टी.एच. खुबानी; 3 संस्थान किस्म रिलीज़ समिति द्वारा जारी किये गए। इन किस्मों को उत्पादित कर, राष्ट्रीय स्तर पर जारी करने हेतु सम्पूर्ण शीतोष्ण क्षेत्रों में परीक्षण किया जा रहा है।

प्रक्षेत्र जीन बैंक में शीतोष्ण बागवानी फसलों के 1844 जननद्रव्य वंशक्रमों का संकलन कर अनुरक्षण किया जा रहा है। सेब में 236 देशी एवं विदेशी किस्में जैसे स्पर वाली, कलर म्यूटैन्ट, पामा रोगरोधी, कमशीतन संकर, परागण एवं प्रसंस्करण के लिए उपयुक्त प्रजातियाँ तथा स्वदेशी अम्बरी तथा अन्य संकलन स्थापित किये गये हैं तथा विभिन्न आर्थिक वर्णों के लिए मूल्यांकन किया जा रहा है। इसके अतिरिक्त देशी एवं विदेशी 24 मूलवृंत संकलित किये गये हैं तथा सम्वर्धित किये जा रहे हैं। स्पर प्रजातियों में वेल स्पर, रेड चीफ, स्टार क्रिम्सन, ओरेगन स्पर तथा रंग प्रारूप स्काईलाइन सुप्रीम में उच्च उत्पादकता एवं शीघ्र रंग विकास पाया गया।

अखरोट में 196 स्वदेशी चयन तथा 17 विदेशी व स्वदेशी, निर्यातगुणवत्तायुक्त किस्में एकत्र की गयी हैं तथा स्थापित किया गया है। इनमें से 143 जननद्रव्यों में पैदावार शुरू हुई है जिनके फल (नट) तथा गिरी (कर्नेल) वजन विस्तृत श्रृंखला में पाये गये। कुछ उत्तम प्रारूपों के मूल्यांकन तथा वितरण के लिए सम्वर्धन किया जा रहा है।

बादाम के प्रक्षेत्र जीन बैंक में 30 देशी एवं विदेशी प्रारूपों को स्थापित किया गया है जिनमे कुछ प्रारूपों में फल देर में लगते हैं। बादाम की आई एक्स एल, प्राइमोरस्किज, नान पेरियल, प्रानयाज, शालीमार, वारिस प्रजातियाँ आशाजनक पायी गयीं, जिनकी उपज 2 से 3 टन/है. तथा गिरी का अनुपात 60 प्रतिशत तक पाया गया ।

खुबानी के 39 देशी एवं विदेशी संकलन रखे गये हैं जिनमें से अधिकतर संकलन उच्च उपज तथा टी.एस.एस. के साथ आशाजनक पाये गये हैं। कॉमिन्स होली प्रजाति उच्चतम टी.एस.एस. (17.27^0 ब्रिक्स) के साथ सबसे मीठी पायी गयी। सी.आई.टी.एच. खुबानी-1 में तने की परिधि 91.0 से.मी. फलवजन 44.53 ग्रा./फल तथा फल उत्पादन 23.50 कि.ग्रा./वृक्ष पाया गया, जबकि हरकोट में उच्च अम्लीयता 0.55 प्रतिशत पायी गयी।

चेरी में 22 देशी एवं विदेशी प्रजातियाँ तथा चयन प्रक्षेत्र जीन बैंक में स्थापित किये गये हैं। विदेशी प्रविष्टियाँ स्टेला, वैन, बिंग, रेजिना, ल्यूपिनस तथा कुछ क्षेत्रीय चयन बहुत आशाजनक पाये गये हैं तथा इनका क्लोनल एवं बीजू मूलवृंतों पर सम्वर्धन किया जा रहा है।

प्रक्षेत्र जीन बैंक में आड़ू की 23 प्रजातियाँ तथा नेक्टरिन की 2 प्रजातियाँ स्थापित की गयी हैं तथा इनका पुष्पन, उपज, गुणवत्ता एवं अन्य गुणों के लिए मूल्यांकन किया जा रहा हैं। प्रजातियों के भौतिकीय व रसायनिक तथा गुणवत्ता मूल्यांकन के आधार पर फैनटसिया नेक्टरिन तथा क्रेस्ट हेवेन, रेड ग्लोब एवं निमला आशाजनक पाये गये।

प्रक्षेत्र जीन बैंक में आलू बुखारा के 24, नाशपाती के 37, अनार के 15 प्रारूप तथा अन्य गौण फलों के देशी तथा विदेशी प्रारूप स्थापित किये गये हैं। इनमें से आलू बुखारा की 5 प्रजातियाँ तथा अनार की 3 प्रजातियाँ बहुत आशाजनक पायी गयी है जिनका किसानों में वितरण हेतु सम्वर्धन प्रगति पर है।

कीवी फल में 5 विदेशी (1 नर तथा 4 मादा) प्रजातियाँ संकलित कर मूल्यांकन हेतु लगायी गयी हैं। कीवी फल को कश्मीर क्षेत्र में लोकप्रिय बनाने के लिए कृषक भागीदारी अनुसंधान कार्यक्रम के अन्तर्गत विभिन्न प्रदर्शन क्षेत्र स्थापित किये गये हैं।

अंगूर में 8 देशी एवं विदेशी किस्मों एवं मूलवृंतों का प्रक्षेत्र जीन बैंक स्थापित करने के लिए, राष्ट्रीय अनुसंधान

केन्द्र (अंगूर), पुणे से लाकर लगाया गया है तथा विभिन्न वृद्धि मानकों पर आँकड़े एकत्र किये जा रहे हैं। जैतून में कुल 18 विदेशी प्रजातियाँ संकलित एवं संरक्षित की गयी है तथा इनकी वृद्धि, उपज एवं गुणवत्ता विशेषताओं के लिए मूल्यांकन किया जा रहा है। इन प्रजातियों में निम्न द्रुतशीतन, मध्य और उच्च द्रुतशीतन प्रकार, परागण किस्में, तेल एवं अचार किस्में एवं फल किस्में सम्मिलित हैं।

विविधीकरण एवं बेमौसमी खेती हेतु ब्रोकोली, लेट्यूस, चीनी पत्तागोभी, पार्सले, सेलेरी, आर्टीचोक, ऐस्परेगस, प्रान एवं हाकसाग का आगमन एवं मूल्यांकन कर किसानों में वितरण हेतु आशाजनक प्रजातियाँ चिन्हित की गयी है।

मिर्च में 380 प्रारूपों में से उपज एवं रंग के आधार पर चिन्हित 25 प्रारूपों का सम्वर्धन किया जा रहा है। सगिया मिर्च में, श्रीनगर में 45 प्रारूपों में से 10 तथा मुक्तेश्वर में 14 में से 2, बैगन में 30 जननद्रव्यों में से 5 प्रारूपों तथा टमाटर में 60 प्रारूपों में से 8 प्रजातियाँ उपज तथा गुणवत्ता मानको के आधार पर चिन्हित की गयीं।

प्याज में 55 प्रारूप जिनमें लाल, सफेद, पीला, गुच्छेवाले एवं गुणक प्रकार वाले सम्मिलित एवं संकलित किया गया है। लहसुन में 31, लीक में 2, गाजर में 65, मटर में 32, तथा शलजम में 32 प्रारूपों का सम्वर्धन एवं मूल्यांकन किया गया।

केसर में 32 प्रविष्टियों को स्थापित किया गया है जिनकी स्टिगमा तथा पिस्टिल की लम्बाई, वजन, पत्तियों एवं पेरियन्थ की लम्बाई में विविधिता पायी गयी तथा उत्तम क्लोनों की उपज दूसरे वर्ष मं 3.4 कि.ग्रा./है. से 4.1 कि. ग्रा./है. प्राप्त हुयी।

जरबेरा में 50 जननद्रव्यों का संकलन किया गया तथा इनका वृद्धि और पुष्पन विशेषताओं के लिए मूल्यांकन किया गया। इनमें से प्रारूप जी-16, जी-17, जी-18 तथा जी-20 आशाजनक पाये गये।

औषधीय एवं सजावटी पौधों में कुल 189 प्रारूपों का संग्रह कर मूल्यांकन एवं संरक्षण किया गया है जिन्हें प्रजनन, प्रजाति तथा तकनीक विकास में उपयोग किया जायेगा।

अखरोट में पुष्पन अध्ययन द्वारा यह इंगित हुआ है कि 29 में से 21 प्रारूपों में मादा फूल पहले आते हैं तथा अधिकतर प्रारूपों में मादा व नर फूलों का खिलना संयोग करता है। सेब में पराग संगतता का अध्ययन अन्तः किस्मों में संकरण करा कर किया गया। जिसमें सर्वाधिक रेड फूजी फलन सभी किस्मों के संकरण से ज्यादा प्राप्त हुए। सर्वाधिक फलन गोलडन डीलीसीयस किस्म को ओरेगोन स्पर से संकरण कराने पर दर्ज किया गया, जबकि ओरेगोन स्पर को विस्टा बेला, रेड चीफ, कुपर-4, सिल्वर स्पर, वेन्स डीलीसियस व रेड चीफ से संकरण कराने पर कोई फलन दर्ज नही किया गया।

बड़े पैमाने पर लिलियम व चेरी गुणवत्ता की रोपण सामग्री के उत्पादन हेतू सुक्ष्म प्रवर्धन प्रोटोकॉल का मानकीकरण किया गया तथा सेब व अखरोट में प्रोटोकॉल का मानकीकरण कार्यरत है।

केसर में वर्तिकाग्र जैसी संरचना का स्वस्थाने दशा में विकास हेतू मानकीकरण किया गया। प्रारंभिक परिणामों में गुणवत्ता वाली एस.एल.एस., सेफरानल की तुलना में अच्छा प्राप्त हुआ।

फसल उत्पादन

सेबः सड़ी गली खाद, कृमिखाद, अजैव खाद समाकलित रूप से विभिन्न मात्रा में 7 वर्ष के सेब (स्टारक्रिमशन) के पौधे में प्रयोग करने पर 5 वर्ष व 6 वर्ष की अवस्था से अच्छी वृद्धि व पायी गई। 70 कि.ग्रा. सड़ी गली खाद + 16 कि.ग्रा. कृमि खाद + अजैव खाद व पत्तियों की खाद तथा काली पॉलीथीन की पलवर उपचारित वृक्षों में फलों की अच्छी गुणवत्ता प्राप्त हुई। विभिन्न सधाई प्रकारों जैसे की (एसपेलीयर, कोरडोन, स्पीनडल बुश, मोडीफाइड सेंट्रल लीडर, सेंट्रल लीडर, हेड व स्प्रेड तथा वर्टीकल ऐक्सीस) का विकास किया गया तथा धूप बाधा, फूलों, फलों व प्ररोही वृद्धि के अच्छे परिणाम प्राप्त हुए हैं।

बादामः बादाम के 5 वर्ष पुराने वृक्षों में सर्वाधिक तना मोटाई क्षेत्र, फलों की संख्या और उत्पादन प्रति पेड 3.5 X 3.5 मीटर की रोपण दुरी वाले वृक्षों में पाया गया। जबकि सर्वाधिक उत्पादकता 3 X 3 मीटर रोपण अंतराल में 1.91 टन/है. वारिस किस्म में तथा इसके बाद मखदूम (1.87 टन/है. व शालीमार 1.69 टन/है. प्राप्त हुई है।

कश्मीर के करेवा भागों में बादाम की खेती को प्रोत्साहित करने हेतू वर्षा जल संचय व स्वस्थाने नमी संरक्षण जैसी

तकनिकीयों का विकास किया है। गिरी उत्पादन व मृदा नमी की स्थिति के आँकड़ों के अनुसार सर्वाधिक फलों की संख्या व उत्पादन (2355, 3.56 कि.ग्रा./पेड़ एवं 2.22 टन/हे.) पुरे चाँद संरचना + पॉलीथीन पलवार व इसके बाद आधा चाँद + पॉलीथीन पलवार (2267, 3.45 कि.ग्रा./पेड़ 2. 16 टन/हे.) प्राप्त हुआ। इनकी तुलना में कंट्रोल में सबसे कम (894, 1.28 कि.ग्रा./पेड़ 0.80 टन/हे.) प्राप्त हुआ।

अखरोट: पौध रोपण सामग्री संबंधित तकनिकियों का मानकीकरण किया गया । सभी प्रकार की मातृ पौधे की कलमों में जो कलम टहनी के मध्य भाग से ली गई उसमें सबसे ज्यादा सफलता फन्नी कलम द्वारा व पॉलीघर की दशा में मार्च के महीने में प्राप्त हुई। विभिन्न समयों पर कलम चढ़ानें में सर्वाधिक कलम बांधनें में सफलता 15 मार्च की तारीख को की गई ग्राफ्टींग में मिली। सभी प्रकार के वातावरणों में, खुले वातावरण की तुलना में कम लागत वाला पॉलीघर या पॉलीट्रेंच की दशा अच्छी नमी व आर्दश तापमान के कारण सबसे आर्दश पायी गई।

खुबानी: सभी 39 किस्मों में कॉमिंसहोली में सर्वाधिक पौध ऊँचाई (5.64 मी.) और चँदवा फैलाव (4.27 X 3.76 मी.) और टी.एस.एस. (17.340 ब्रिक्स जबकि तना मोटाई (91.0 सें.मी.) फल वजन (44.53 ग्राम/फल) और फल उत्पादन 23.50 कि.ग्रा./पेड़) सी.आई.टी.एच. खुबानी-1 में व सर्वाधिक अम्लीयता हारकोट में (0.55 प्रतिशत) पायी गई।

आड़ू: कुमायूं की पहाड़ियों की दशा में आड़ू की सघन रोपण प्रणाली हेतू जैविक कृषि तकनिकियों का मानकीकरण किया गया। कृमिखाद + माइकोराइजा द्वारा उपचारित वृक्षों में, नाडाप + माइकोराइजा व सड़ी गली खाद + माइकोराइजा की तुलना में सर्वाधिक प्ररोही वृद्धि हुई और अच्छे परिणाम प्राप्त हुए।

बेबी मक्का के एक प्रयोग में सभी जैविक उपचारों में उपचार T_2 (कृमिखाद + बॉयोस्पाइरीजम + बॉयोफॉंस + बॉयोपोटास) में सर्वाधिक बेबी मक्का वजन, भुट्टे की ढूँढ का वजन व उत्पादन प्राप्त हुए।

कट फ्लावर: फुचसीयाँ में प्लग प्लांट उत्पादन की तकनीक का मानकीकरण किया गया। सभी पाँच प्रकार के सम्मिलित माध्यम और 3 एन.पी.के. उपचारों में सर्वाधिक प्लग प्लांट का ताजा वजन पीट मॉस + परलाइट (3:1) माध्यम व खाद की मात्रा एन:पी:के 12:1:1 में प्राप्त हुए।

गलेडियोलस के अच्छी गुणवत्ता वाले कट फ्लावर व कंद उत्पादन के लिए कृषि तकनिकियों का मानकीकरण किया गया।

सब्जियों की संरक्षित खेती

उच्च मुनाफे वाली सब्जियाँ जैसे टमाटर, शिमला मिर्च और खीरा को कम लागत वाले पॉलीघर में विभिन्न सधाई विधियों व रोपण अन्तराल में उगाया गया।

शिमला मिर्च की एस.एच.एस.पी.-406 किस्म में एकल स्तम्भ सधाई प्रणाली व रोपण अन्तराल 30 X 50 सें.मी. में तथा शालीमार शिमला मिर्च संकर-1 में एकल स्तम्भ तथा केंलिफोरनियाँ वन्डर में बिना कटाई के सर्वाधिक पैदावार दर्ज की गई। खीरा किस्म एन.एस.एक्स.-2 (78.0 टन/हैं.) व एस.एच.-सी.एच.-1 (54.0 टन/हैं.) व एस.एच.-सी.एच. -5 (53.2 टन/हैं.) ने एकल व दो टहनियों के साथ बिना कटाई के अच्छा प्रदर्शन किया है।

टमाटर किस्में एन.एस.-6677(53.2 टन/हैं.) व हीम सोना (52.1 टन/हैं.) में दो तना सधाई प्रणाली में अधि कतम पैदावार प्राप्त हुई।

पच्छ तुड़ाव प्रबंधन

- विभिन्न रसायनों टी.बी.जेड., ग्वारभाठा, संकुचित कवर द्वारा स्ट्रावेरी, खुबानी व चेरी फलों की गुणवत्ता को कायम रखने हेतु न्यूनतम प्रसंस्करण, भराई व भंडारण तकनिकियों का अध्ययन किया व भंडारण क्षमता को बिना फल वजन कमी के प्रभावकारी रूप से बढ़ाया।
- तुड़ाई से पूर्व विभिन्न रसायनों का पर्णीय अनुप्रयोग करने से यह पाया कि कैल्सियम सल्फेट 2000 पीपीएम, द्वारा उपचारित जीनप्रारूपों में फलों का फटना क्रमशः ज्योति (17.60), डोलका (19.93) व कन्धारी में (23.94) प्रतिशत जबकि कैल्सियम सल्फेट 3000 पीपीएम द्वारा उपचारित जीन प्रारूपों में क्रमशः बेदाना (20.16) व जी-137 (15.42) प्रतिशत प्रभावकारी रूप से नियंत्रित हुआ, जबकि अनुपचारित जीवप्रारूपों में फलों का फटना क्रमशः ज्योति (33. 29), डोलका (40.45), कन्धारी में (46.53), बेदाना (39.86) व जी-137 (36.79) प्रतिशत पाया गया।

- खुबानी व चेरी की भराई व ओस्मो डीहाइड्रेटेड उत्पाद बनाने हेतू कम लागत वाली तकनिकियाँ विकसित की गईं।
- आड़ू का भंडारण जीवन अच्छी भौतिक-रसायन गुणवत्ता के साथ और सबसे कम फल वजन में कमी के साथ सेलिसाइलिक अम्ल व केल्सियम एडीटा द्वारा प्राप्त किया गया।

फसल संरक्षण

- *फ्यूजेरियम पेलीडोरेसीयम* द्वारा होने वाला म्लनि रोग कश्मीर घाटी में एक प्रमुख समस्या है। अधिकतम रोग शमन यानि 60.4 प्रतिशत, कार्बन्डाजिम 0.05 प्रतिशत + मैंकोजेब 0.2 प्रतिशत में तथा 42.4 प्रतिशत, कार्बन्डाजिम 0.1 प्रतिशत में तथा 40.2 प्रतिशत, *ट्राईकोडरमा वीरीडी* से ड्रेन्चिंग 30 ग्राम/ पौध, 3 ग्राम/100 मिली में मूलों को डुबो कर प्राप्त किया है।
- केसर के घनकंद विगलन रोग के प्रबंधन में सर्वाधिक पौधे (55.7 प्रतिशत) *ट्राइको एक्स पी-टी विरीडी* 5 ग्राम/कि.ग्रा. द्वारा उपचारित तथा इसके बाद ऐजेटोबेक्टर स्पीशीज 5 ग्राम/कि.ग्रा. यानि 49.6 प्रतिशत द्वारा उपचारित घनकंदो में दर्ज की गई। सर्वाधिक फूलों की मात्रा भी यानि 34.8 प्रतिशत *ट्राइको एक्स पी-टी विरीडी* 5 ग्राम/कि.ग्रा. व इसके बाद 27.2 प्रतिशत *रेजेटोबेक्टर स्पीशीज* द्वारा उपचारित घनकंदों में दर्ज की गई। अनुपचारित घनकंदों में उपचारित की तुलना में पौधे 33.4 प्रतिशत व फूलों की मात्रा 18.2 प्रतिशत दर्ज की गई।
- जैविक कारको (*बिवेरिया बैसिआना* और *मेटेराजम ऐनीसोपली*) का समुह में उत्पादन किया गया। जैविक कारकों का अनुसंधान प्रक्षेत्रों में सफेद कुरमुला के नियंत्रण में बहुत अच्छे परिणाम प्राप्त हुए है।
- क्रेसाविसम मीथाइयल 0.03-0.05 प्रतिशत की दर से तथा हेक्सा कोनाजोल 0.05 प्रतिशत की दर से मई के द्वितीय पखवाड़े में और जून के प्रथम पखवाड़े में दो बार छिड़काव करने से सेब के पामा रोग के द्वितीय संक्रमण का प्रभाकारी ढंग से प्रबंधन किया जा सकता है।
- सेब बरूथी (*पेनोनायकस अलीमी*) की प्रभावकारी रोकथाम हेतू दुसरे उपचारों की तुलना में फेनपायरोक्सीमेट 5 प्रतिशत ए सी, 0.005 प्रतिशत की दर से सबसे सार्थक उपचार पाया गया।
- आरबसकूलर माईकोराइजल कवक सेब में *डीमेटोफोरा नेकटरिक्स* व *कोमेटोस्पोरम कोनीयोथीसीयम* की रोकथाम में काफी आशाजनक पाया गया। आरवसकूलर माईकोराइजल कवक का पौधों में निवेशन करने से इन पौधों की वृद्धि व उत्तरजीविता के अच्छे परिणाम प्राप्त हुए हैं।

अच्छी गुणवत्ता वाले पौध रोपण व मूलाधार बीजों का उत्पादन

चश्मा चढ़ाना, कलम बाँधना, कलम द्वारा, गुटी इत्यादि द्वारा करीबन 1.24 लाख क्लोनल व बीजू मूलवृंत व सर्वोत्कृष्ट किस्मों के 56000 पौधे वर्ष 2009.10 में उत्पादित किये हैं। जिसमें सेब में (12000 संख्या में), बादाम में (25000), नाशपति में (3000), चेरी में (3000), खुबानी में (5000), आलु बुखारे में (2000), आड़ु में (3000), स्ट्राबेरी में (20000) व अखरोट में (3000) पौधे शामिल है। इसके अलावा भारी मात्रा में (2.50 लाख) कलिका युक्त टहनी/सांकुरक टहनी का भी राज्य के विभागों को, नर्सरी कार्यकर्त्ताओं को व किसानों को वितरित किये तथा इन पौध रोपण सामग्री का उपयोग चश्मा चढ़ना व कलम बांधने में भी किया गया। क्षेत्रीय अनुसंधान केन्द्र, मुक्तेश्वर में वर्ष 2009-2010 में कुल 10000 कलम चढ़ाये पौधे उत्पादित किये तथा विभिन्न अनुसंधान के प्रयोगों के लिए वितरित व उपयोग में लाये गयें। पौधों के अलावा, संकर व अच्छी गुणवत्ता वाले सब्जियों के बीज व सब्जियों की बीजू पौध (1.7 लाख) तथा केसर के घनकंद (1 लाख) भी पैदा किये गये तथा बागवानी तकनीकी मिशन के अन्तर्गत किसानों को वितरित किये गये।

Executive Summary

Crop Improvement

Five genotypes of walnut superior in yield and kernel quality namely CITH-Walnut-I, CITH-Walnut-II, CITH-Walnut-III, CITH-Walnut-IV and CITH-Walnut-V and three genotypes of apricot high in yield and superior in table quality namely CITH-Apricot-I, CITH-Apricot–II, and CITH-Apricot-III were released by the Institute Variety Release Committee. These varieties are now being multiplied and tested in entire temperate region of the country for release at national level.

At field genebank, as many as 1844 germplasm lines of temperate horticultural crops have been collected and maintained. In apple, a total of 236 exotic and indigenous apple cultivars such as spur type, colour mutants, scab resistant, low chilling hybrids, pollinizing and processing varieties and indigenous Ambri and other collections have been established and are being evaluated for various economic characters. Besides varieties, a total of 24 clonal rootstocks of both indigenous as well as exotic ones have also been made and are being used for propagation. Among the spur type cultivars, Well Spur, Red Chief, Starkrimson, Oregon Spur and colour stain Skyline Supreme were found high yielding and developed colour very early.

In walnut a total of 196 indigenous selections and 17 exotic and indigenous varieties having export quality traits have been collected and established. Among these 143 genotypes are in bearing whose nut and kernel weight showed wide range. Some of the elite genotypes are being multiplied for further evaluation and distribution.

A field gene bank of 30 exotic and indigenous genotypes of almond including some late blooming genotypes has been established. The cultivars IXL, Primorskij, Non Pareil, Pranyaj, Shalimar, Waris and Makhdoom among the cultivars are found promising with nut yield ranging from 2 to 3 t/ha with kernel recovery as high as 60 percent.

In apricot, 39 exotic and indigenous collections have been raised and most among the collections have been found very promising with high yield and TSS. The variety Commince Holly is found very sweet with highest T.S.S. (17.27^0Brix). stem girth (91.0 cm), fruit weight (44.53 g/fruit) and fruit yield (23.50 kg/tree) was in CITH Apricot -1. The acidity was however found high in Harcot (0.55%).

In cherry, a field gene bank of 22 exotic cultivars which include both exotic and indigenous selections has been established. The exotic introductions such as Stella, Van, Bing, Regina, Lupinus and few local selections have been found very promising and these are being multiplied on clonal and seedling rootstocks.

A field gene bank of 23 varieties of peach and 2 of nectarine has been established and are being evaluated for flowering, yield, quality and other attributes. Among the varieties Fantasia Nectarine, Crest Heaven, Red Globe and Nimla have been found promising on the basis of physico-chemical and quality attributes.

In plum, a field gene bank of 24 genotypes, pear 37 genotypes, pomegranate 15 genotypes and other minor nuts has been established with both exotic and indigenous types. Out of which 5 varieties in plum and 3 varieties in pomegranate are found very promising and are being multiplied for distribution among the farmers.

In Kiwi fruit, 5 exotic ones (1 male and 4 female types) have been collected and planted in the field for evaluation. For popularization of kiwifruit cultivation, various demonstrations in Kashmir region have also been established under farmer's participatory research programme.

In grape, a field gene bank of eight indigenous as well as exotic varieties and rootstocks of grape have been collected from NRC, Grape, Pune and planted in field and data on various plant growth parameters is being recorded. In olive, a total of

18 exotic cultivars have been collected, conserved and are under evaluation for growth, yield and quality attributes. The collections include cultivars such as low chilling, mid chilling and high chilling types, pollinizers, oil, table, and pickle types.

For diversification and off season cultivation, number of varieties in broccoli, lettuce, Chinese cabbage, parsley, celery, artichoke, asparagus, pran and kale were introduced, evaluated and identified promising varieties in each crop for distribution and popularization in the temperate region.

In chilli from among 380 genotypes, 25 promising lines rich in colour and yield have been identified and are being multiplied. In sweet pepper ten lines among 45 genotypes in Srinagar and two lines among 14 selections from Mukteshwar, in brinjal 5 genotypes among 30 lines and 8 cultivars among 60 tomato genotypes have also been made having superior yield and quality attributes.

A collection of 55 genotypes in onion, which contain red, white, yellow, bunching and multiplier types, thirty one selections in garlic, two in leak and 65 in carrot, 32 in peas and 24 in turnip are also being multiplied and evaluated.

In saffron, a field gene bank of 32 accessions have been established, which comprises of accessions having varied stigma and pistil length, wet and dry weight, foliage and perianth length, number of leaves etc. the saffron yield of elite clones ranged from 3.4kg/ha to 4.1 kg/ha in 2nd year of planting.

In gerbera, a total of fifty different lines were collected and evaluated for growth and flowering characteristics, among the lines the genotypes G-16, G-17, G-18 and G-20 were found promising.

In ornamental medicinal and aromatically plants a total collection of 189 genotypes have been collected, evaluated and maintained for further breeding and for development of suitable technologies and varieties.

In walnut, the floral biology indicated 21 out of 29 genotypes to be protogynous in nature with most of the genotypes having synchronized blooming of male catkins and female flowers. To study the pollen compatibility inter-varietal crosses in apple were attempted. Among the cultivars, Red Fuji set good fruits with majority of varieties crossed. Highest fruit set was recorded when Golden Delicious was crossed with Oregon Spur. However, Oregon Spur did not set fruits with Vista Bella, Red Chief, Cooper-4, Silver Spur, Vance Delicious and Top Red.

Micro-propagation protocols for production of large scale quality planting material have been standardized for lilium and cherry and work on apple and walnut in under progress.

Development of stigma like structures in saffron under *In-vitro* conditions has been standardized. Initial results reveal a quality production of SLS with respect to saffranal content.

Crop Production

Apple: Integration of FYM, vermicompost and inorganic fertilizers at different proportions applied on 7 year old apple cv. Starkrimson improved plant growth over the previous 5th and 6th years. Fruit quality parameters were improved especially by treatment of 70 kg FYM+16kg vermicompost+ inorganic fertilizers under leaf mould, followed by black polythene mulch. Different training systems such as Espalier, Cordon, Spindle Bush, Modified Central Leader, Central Leader, Head and Spread and Vertical Axis have been developed and most of them are showing good response in terms of light interception, flowering, fruiting and vegetative growth.

Almond: The maximum cross sectional area of tree, nut number and yield per tree were maximum in the spacing 3.5x3.5m. However, yield per hectare was maximum in 3x3m spacing yielding as high as 1.91 t/ha for cv Waris followed by Makhdoom (1.87t/ha) and Shalimar (1.69t/ha) in 5 year old plantations.

Rain water harvesting and *in-situ* moisture conservation techniques for almond production under rain fed conditions in Kashmir Karewas has been developed. The data on nut yield and soil moisture status indicated that maximum nut number and yield (2355 Nos, 3.56 kg/tree and

2.22t/ha) were recorded in full moon structure + plastic mulch followed by half moon + plastic mulch (2267 Nos, 3.45 kg/tree 2.16 t/ha) and minimum in control (894 Nos 1.28 kg/tree 0.80 t/ha).

Walnut: Planting material production techniques have been standardized. Among scion types the scion wood taken from middle portion recorded highest grafting success in wedge graft under polyhouse conditions done during middle of March. Among the different times of grafting, 15th March was best date for maximum graft success. Among different environments low cost polyhouse or polytrench was found ideal with for maximum success due to better humidity and ideal temperature than open field.

Peach: Organic agro -techniques for peach under high density planting system in Kumaon Hill conditions has been standardized. Treatment comprising Vermi-compost+ mycorrhiza resulted into better vegetative growth during the period under study, which was closely followed by Nadep + mycorrhiza and FYM + mycorrhiza.

Baby corn: The experiment on baby corn indicated that among different organic treatments, the treatment T_2 (Vermicompost+ *Biospirillum* + Biophos + Biopotash) recorded the maximum baby corn weight, cob weight and yield and corn yield.

Cut flowers: Techniques for plug plant production in *Fuchsia* has been standardized. Among five different combinations of media and 3 NPK, the fresh weight of plug plants was found maximum in medium containing peat moss +perlite (3:1) with a fertilizer dose of N-P-K: 12-1-1. Agro techniques for quality cut-flower and corm production of gladiolus have also been standardized.

Protected Cultivation of Vegetables

High value crops like tomato, capsicum and cucumber were raised under protected low cost polyhouses using different training systems and spacings. In capsicum, variety SH-SP-406 with single stem showed highest yield and in spacing 30x50, Shalimar capsicum hybrid-1with single stem and variety California Wonder and Nishat without prunning showed highest yield. In cucumber NSX-2 (78.0 t/ha) and SH-CH-1(54.0 t/ha) and SH-CH-2 (53.2 t/ha) performed better with single and two branches than unprunned plants. In tomato, NS-6677 (53.2t/ha) with double stem training followed by Heem Sona (52.1t/ha) with same training system gave the highest yield.

Post Harvest Management

- Minimal processing, packaging and storage study of strawberry, apricot and cherry for quality maintenance and storage was conducted using different chemicals such as TBZ, *Aloe vera*, shrink rap etc and all these found effective in extending shelf life with least PLW.
- Preharvest foliar application of different chemicals indicated that minimum fruit cracking (%) was recorded with the treatments of $CaSO_4$ 2000 ppm in genotypes Jyoti (17.60), Dholka (19.93) and Kandhari(23.74) while Ca SO_4 3000 ppm found effective in Bedana (20.16) and G-137 (15.42) as compared to control (33.29, 40.45, 46.53, 39.86, 36.79).
- A low cost Technology has been developed for making osmo dehydrated products of apricot and cherry including packaging.
- Shelf life of peach enhanced significantly with better retention of physico-chemical and quality parameters and lowest PLW(%) by treatment with salicylic acid followed by Ca-EDTA.

Crop Protection

- Wilt diseases in chilli caused by *Fusarium pallidoreseum* is a major problem in the Kashmir valley. The maximum disease mitigation i.e. 60.4 percent was recorded in Carbendazim 0.05 % + Mancozeb 0.2 % followed by 42.4 percent in Carbendazim 0.1% and 40.2 percent in drenching with *Trichoderma viride* 30g /plant with 3g/100 ml for root dip.
- In saffron, maximum plant stand of 55.7 percent was recorded with Tricho XP-*T.viride,* (5g/kg) followed by *Azotobacter sp.*5g/kg i.e.

49.6 percent. The flowering too was recorded maximum i.e. 34.8 percent in Tricho XP-*T.viride,* 5g/kg followed by *Azotobacter sp.,* 5g/kg i.e. 27.2 percent as compared to 33.4 percent plant stand and 18.2 percent flowering in check.

- Mass multiplication of bioagents (*Beauveria bassiana* and *Metarrhizium anisopliae*) has been done. Application of bioagents in the field showed very promising results with respect to control of white grub.
- For management of secondary scab infection two sprays of Kresoxim methyl @ 0.03-0.05 percent as well as Hexaconazole @ 0.05 percent found effective when applied in second fortnight of May and first fortnight of June in the orchard.
- For controlling apple mite (*Panonychus ulmi)* Fenpyroximate 5% SC @ 0.005% concentration was significantly superior to all other treatments.
- Arbuscular mycorrhizal fungi (AMF) have been found promising in control of *Dematophora necatrix* and *Chomatosporum Coniothecium* in apple. AMF inoculation resulted in improved survival and growth of mycorrhizal plants.

Quality Planting Material and Nucleus Seed Production

About 1.24 lakh clonal and seedling rootstock and 56000 plants of elite varieties of apple, almond, peach, pear, plum, cheery, walnut, apricot, strawberry etc were produced during 2009-10 through budding, grafting, cutting, layering etc. Besides root stock and budded / grafted plants, a large quantity of bud wood/ scion wood (2.50 lakhs) was also produced and distributed to state Departments, nursery men and farmers and also used in grafting and budding. At Regional Station Mukteshwar, during 2009-2010 a total of 10,000 grafted plants have been produced and distributed/utilized for research experiments. Besides plants, hybrids and quality seed ofvegetables and large quantity of vegetable seedlings (1.7 lakh) and saffron corms (1.0 lakh) were also produced and distributed to farmers under HTM project.

Introduction

The existing production of temperate fruits in the country is about 25.8 lakh tonnes while the demand as per the normal dietary requirement is about 44 lakh tones, resulting in a deficit of about 18 lakh tonnes. No doubt, there has been an increase in the area, production and productivity over the period, but this increase has not been concomitant with the increase in population. The productivity too is below the world average and of developed nations mainly because the indigenous genetic sources have remained unexplored and/or the exotic genetic sources and technologies are yet to be exploited fully. The temperate horticulture although has made some progress, but considering the enormous natural resource availability and keeping in view the productivity and quality of crop produce compared to developed countries, still lot more to be done in crop improvement, production, protection, post harvest management of temperate horticultural crops without disturbing the fragile hill and mountainous eco-system. With the increasing competition from other countries, climate change etc., technologies and the varieties/hybrids suiting to both consumers and producers have to be made available.

To exploit the vast potentialities of temperate horticultural crops in the region and to gear up temperate horticultural production and productivity, the research on temperate horticultural crops is being concentrated at Central Institute of Temperate Horticulture, Srinagar and at its Regional Station, Mukteshwar (Uttarakhand) with the following mandates and objectives

Mandate

- To act as national repository of germplasm & scientific information on temperate horticultural crops.
- To undertake basic, strategic and applied research on temperate horticultural crops in collaboration with national and international agencies to enhance productivity and quality.
- To serve as centre of training for human resource development & transfer of technology.

Major Objectives

- To augment the existing germplasm with superior genotypes from indigenous as well as from exotic sources having resistance to biotic and abiotic stresses.
- To devise efficient propagation and cost effective production technologies for increasing productivity and improving quality of temperate horticultural crops including intercropping and cropping systems for orchards.
- To develop eco-friendly disease/pest management techniques including mitigation of post harvest spoilage.
- To reduce post-harvest and storage losses to minimum level and generate more income through value addition and processing.
- To increase foreign exchange earnings through export and to reduce import of items.

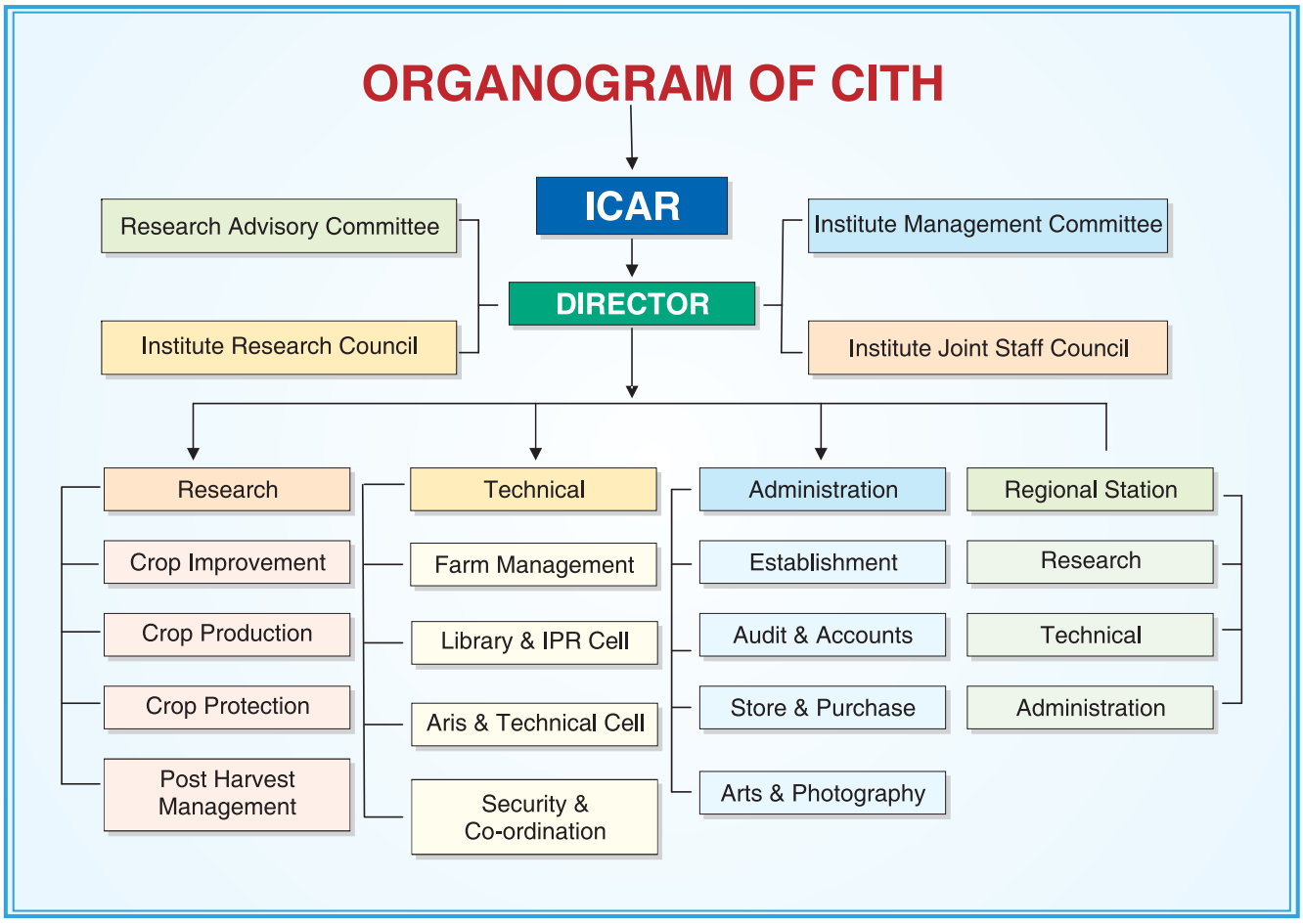
Staff Position (2009-10)

Category	Sanctioned	Filled	Vacant
Scientific	21+1 RMP	15+1 RMP	06
Administrative	12	9	03
Technical including drivers	13	11	02
Supporting	13	11	02
Total	59+1RMP	46+RMP	13

Financial Statement (2009-2010)

(Values in Lacs.)

S. No.	Sub-Head	Non-Plan		Plan	
		Allocation	Expenditure	Allocation	Expenditure
1	Establishment. Charges	169.48	166.51	75.40	75.38
2	T.A.	3.34	3.33	7.25	7.25
3	Other charges	66.16	66.09	178.25	178.19
4	Works	3.03	3.01	99.10	99.09
5	Net work Project	-	-	40.00	40.00
TOTAL		**242.01**	**239.94**	**400.00**	**399.91**



Research Achievements

Crop Improvement

Institute Released High Yielding and Superior Quality Walnut and Apricot Varieties

Five genotypes of walnut superior in yield and kernel quality namely CITH-walnut-1, CITH-walnut-2, CITH-walnut-3, CITH-walnut-4 and CITH-walnut-5 and three genotypes of apricot high in yield and superior in table quality namely CITH-Apricot -I, CITH-Apricot –II, and CITH-Apricot -III were released by Institute Variety Release Committee. These varieties are now being multiplied and tested in entire temperate region of the country for release at national level.


CITH-Walnut-I

CITH-Walnut-I, is suitable for export as well as domestic market, having light kernel color, bold nut (27g), and large kernel size (12.76g), good kernel recovery (47%), light shell colour, long trapezoidal in shape, easy to remove kernel halves. Nut yield 60 kg/tree at 20-25 years of age with 50-60 % increase over check.


CITH-Walnut-II

CITH Walnut-II, nuts are large, ovate, medium shell texture, medium shell colour, strong shell seal, intermediate shell strength, complete shell integrity, satisfactory kernel flavour, well filled kernel, plumy, easy to remove kernel halves and light kernel colour.It gives 13.51 g nut weight and 6.61 g kernel weight. Nut yield 60 kg/tree at 20-25 years of age with 50-60 % increase over check.

CITH-Walnut-III, nuts are large, round, medium shell texture, medium shell colour, strong shell seal, strong shell strength, complete shell integrity, satisfactory kernel flavour, well filled kernel, plumy, difficult to remove kernel halves and light kernel colour. It gives nut weight 16.75 g and kernel weight of 7.69 g. Nut yield 50 kg/tree at 20-25 years of age with 40-50 % increase over check.


CITH-Walnut-III


CITH-Walnut-IV

CITH-Walnut-IV, nuts are large, ovate, rough shell texture, light shell colour, strong shell seal, intermediate shell strength, complete shell integrity, thin, satisfactory kernel flavour, well filled kernel, moderately plumy, very easy to remove kernel halves and light kernel colour. It gives nut weight of 14.24 and kernel weight of 6.92 g. Nut yield 45 kg/tree at 20-25 years of age with 40-45 % increase over check.


CITH-Walnut-V

CITH-Walnut-V, is a high yielder, having extra light kernel color, suitable for export market, bigger nut (19 g) and kernel (9.5 g) size, good kernel recovery (48.9%), light shell color, ovate in shape, moderate to remove the full kernel halves. Nut yield 50 kg/tree at 20-25 years of age with 40-50 % increase over check.


CITH-Apricot-I

CITH-Apricot-I, fruits are bigger in size (42g, round in shape, orange in color with reddish coloration on one side (25-30%), low acidity, high T.S.S (140Brix), suitable for table use and also for

processing. Fruit yield 15-20 tons/ha with 50-60 % increase over check.

CITH-Apricot-II, fruits are yellowish orange in colour, medium in size (23 g), round in shape, low acidity, high T.S.S. (140Brix) and high yielding (16 kg/tree in 6 year age), Suitable for table use and also for processing. Fruit yield 12-15 tons/ha with 40-50 % increase over check.

CITH-Apricot-II

CITH-Apricot-III, fruits color is very attractive with bright colour (30-40% area of fruit with orange back ground), medium in size (18 g), low acidity, high T.S.S. (160Brix) and suitable for desert use. Fruit yield 10-12 tons/ha with 20-30 % increase over check.

CITH-Apricot-III

Survey, collection, characterization and documentation of temperate horticultural crops

Germplasm is the basic source in any crop improvement programme. Under this project, as many as 1844 germplasm lines have been collected and established. A total of 236 exotic and indigenous apple cultivars such as spur type, colour mutants, scab resistant, low chilling hybrids, pollinizing and processing varieties and indigenous Ambri and other genotypes have been collected and established and are being evaluated for various economic characters. Besides varieties, a total of 24 clonal rootstocks of both indigenous as well as exotic ones have also been made and are being multiplied and used for propagation..

In walnut 196 indigenous selections and 17 exotic and indigenous varieties have been collected and established. Among these 143 genotypes are in bearing having wide range for nut and kernel charachters. Some of the elite genotypes such as CITH-W-1, CITH-W-2, CITH-W-3, CITH-W-4 and CITH-W-5 and few others are being multiplied for further evaluation and distribution.

A field gene bank of 30 exotic and indigenous genotypes of almond including some late blooming genotypes has been established. These genotypes have been categorized into soft, medium and hard shelled. The cultivars IXL, Primorskij, Non Pareil, Pranyaj, Shalimar, Waris and Makhdoom among the cultivars are found promising with nut yield ranging from 2 to 3 t/ha with kernel recovery as high as 60 percent.

In apricot 39 exotic and indigenous collections have been raised. Among these three indigenous collections viz CITH-A-1, CITH-A-2 and CITH-A-3 and the exotic variety Harcot have been found very promising with high yield and TSS. The variety Commince Holly is found very sweet with highest T.S.S. (17.27^0Brix).

In cherry, a field gene bank of 22 exotic cultivars which include both exotic and indigenous selections has been established. The exotic introductions such as Stella, Van, Bing, Regina, Lupinus and few local selections have been found very promising and these are being multiplied on clonal and seedling rootstocks.

A field gene bank of 23 varieties of peach and 2 of nectarine has been established and are being evaluated for flowering, yield and quality. Among the varieties Fantasia Nectarine, Crest Heaven, Red Globe and Nimla have been found promising. On an average Crest Heaven has yielded highest 2.99 kg, followed by Fantasia Nectarine (2.10 kg) , Red Globe (1.25 kg) and Nimla (0.96 Kg) per tree respectively in the 2^{nd} year of bearing. On the basis of physic-chemical quality attributes Red Globe and Nimla peach performed better than Fantasia and Crest Heaven.

In plum, a field gene bank of 24 genotypes, pear 37 genotypes, pomegranate 15 genotypes and other minor nuts has been established with both exotic and indigenous genotypes. Out of which 5 varieties in plum and 3 varieties in pomegranate were found very promising and are being multiplied for distribution among farmers.

In Kiwi fruit, 5 exotic ones (1 male and 4

female types) have been collected and planted in the field for evaluation. For popularization of kiwifruit cultivation, various demonstrations at Baramulla, Uri, Salamabad, Srinagar in Kashmir regions have also been established under farmer's participatory research programmes.

In grape, a field gene bank of eight indigenous as well as exotic varieties and rootstocks of grapes have been collected from NRC, Grape Pune, and planted in field. Data on various plant growth parameters has been recorded. In Hussaini and Sahebi varieties flowering and fruiting has been initiated.

In olive, a total of 18 exotic cultivars have been collected, conserved and are under evaluation for growth, yield and quality and other attributes. The collections included low chilling, mid chilling and high chilling types, pollinizers, oil, table, and pickle types. In Frontoio flowering has been observed in 2nd year of planting, and plant survival percentage was as high as 95%. From the morphological data the cultivars Frontio, Pendolino, Picholine, Coratina , Cipressino are found promising.

In chilli a collection of 380 genotypes have been made and evaluated. Among the selections 25 promising lines rich in colour and yield have been identified and are being multiplied. In sweet pepper ten lines among 45 genotypes, in brinjal 5 genotypes among 30 lines and in tomato 8 cultivars among 60 genotypes are found very promising having superior yield and quality attributes.

A collection of 55 genotypes in onion having red, white, yellow, bunching and multiplier types, 31 genotypes in garlic,2 in leak, 20 in lettuce, 3 in asparagus, 80 in kale, 32 in peas, 48 in carrot, 24 in turnip and 20 in seed and leafy vegetables are also being multiplied and evaluated.

In saffron a field gene bank of 32 accessions have been established, which comprises of accessions having varied stigma and pistil length, wet and dry weight, foliage and perianth length, number of leaves etc.

In ornamental medicinal and aromatically plants a total collection of 189 genotypes have been collected, evaluated and maintained for further breeding and for development of suitable technologies and varieties.

Evaluation of walnut genotypes in relation to floral biology and yield attributes

A detailed floral biology of 29 genotypes of walnut was carried out to find out the synchronous period for pollination among the genotypes during 2009-2010. It was found that as campared to 2008-09, during 2009-2010 most of the genotypes under study showed synchronizing flowering for successful pollination. Genotype LFA-1 showed maximum synchronizing phase of 20 days followed by genotype LG-5, FPTBR-1 and LPTBR-2 for 18 days (Table-2). While genotypes LG-9, YKB-3, YKB-5, LFA-3, Wussan-1 and Opex Culchery however showed non-synchronization with respect to male and female blooming period indicating need for pollenizer varieties. Further it was also found that among 29 genotypes 8 were found protogynous in nature and rest were protoandrous.

Table 1. Germplasm collection and conservation at CITH

S. No	Crop/Group	Total collections
1	Fruits:	706
	Pome Stone Nuts Others	297 110 243 56
2	Vegetables	949
3	Ornamentals	164
4	Medicinal & aromatic plants	25
	Total	**1844**

Table 2. Floral biology study in walnut genotypes

S.No.	Geno-types	Date of bud burst	Initiation of male bloom	Days of staminate bloom	Initiation of female bloom	Days of Pistillate bloom	Maturation of reproductive parts	Bloom Synchroni-zation days
1.	LG-5	14-19 March	24/3 - 10/4	17	21/3-11/4	21	Protogynous	18
2.	LG-9	14-20 March	19/3 – 3/4	15	25/3-7/4	13	Protoandrous	7
3.	SP-3	13-25 March	17/3 – 8/4	20	26/3-17/4	22	Protoandrous	13
4.	SBB-3	14-24 March	23/3-10/4	18	24/3-7/4	14	Protoandrous	15
5.	BP-4	15-25 March	21/3-3/4	13	25/3-13/4	19	Protoandrous	10
6.	KPT-5	13-25 March	18/3-5/4	14	24/3-12/4	19	Protoandrous	13
7.	SP-1	13-19 March	18/3-5/4	14	27/3-16/4	20	Protoandrous	10
8.	YKB-3	19-25 March	24/3-30/3	8	15/4-21/4	7	Protoandrous	-
9.	YKB-5	14-18 March	22/3-1/4	10	27/3-11/4	15	Protoandrous	6
10.	YKB-7	15-17 March	25/3-6/4	12	24/3-7/4	13	Protogynous	13
11.	BBW8	15-23 March	27/3-8/4	12	26/3-17/4	22	Protogynous	13
12.	BP-3	15-17 March	19/3-6/4	18	23/3-8/4	16	Protoandrous	15
13.	LFA-1	13-29 March	16/3-154	29	27/3-20/4	24	Protoandrous	20
14.	LFA-3	16-20 March	17/3-30/3	14	26/3-13/4	18	Protoandrous	5
15.	Saloora-1	13-14 March	18/3-9/4	22	27/3-7/4	11	Protoandrous	11
16.	VL-2	14-16 March	19/3-9/4	20	23/3-6/4	14	Protoandrous	14
17.	SH-10	16-23 March	18/3-5/4	18	24/3-16/4	23	Protoandrous	12
18.	Wussan-1	11-13 March	18/3-2/4	15	27/3-12/4	16	Protoandrous	6
19.	Wussan-2	11-15 March	17/3-6/4	20	25/3-10/4	16	Protoandrous	10
20.	LPTBR-2	10-18 March	21/3-13/4	23	25/3-12/4	18	Protoandrous	18
21.	CS-1	12-22 March	25/3-7/4	13	24/3-11/4	18	Protogynous	13
22.	GG-7	17-24 March	25/3-5/4	11	24/3-5/4	11	Protogynous	11
23.	FPTBR-1	13-22 March	25/3-13/4	19	24/3-12/4	19	Protogynous	18
24.	Hamdan	9-26 March	24/3-5/4	12	23/3-5/4	13	Protogynous	12
25.	Sulaiman	13-26 March	23/3-9/4	17	24/3-15/4	22	Protoandrous	15
26.	Opex Cultury	19-21 March	24/3-5/4	12	3/4-14/4	12	Protoandrous	6
27.	Tutle	17-21 March	26/3-7/4	12	24/3-5/4	12	Protogynous	10
28.	Cheinovo	25 March	29/3-11/4	13	1/4-11/4	11	Protoandrous	11
29.	Wussan-8	10-16 March	19/3-9/4	21	25/3-16/4	22	Protoandrous	15

Evaluation of promising genotypes of apricots for table and drying purpose

Thirty nine varieties/genotypes were planted and evaluated in the field (Table-3). Maximum plant height (5.64 m) and canopy spread (4.27 x 3.76m) was recorded in Commince Holly variety. Whereas, stem girth (91.0 cm), fruit weight (44.53 g/fruit) and fruit yield (23.50 kg/tree) was recorded in CITH Apricot -1. Total Soluble Solids were maximum in Commince Holly (17.34 ^{0}Brix) and acidity in Harcot (0.55%).

Performance of apple cultivars

Among the cultivars evaluated, low chilling and early maturing cultivars such as Schlomith, Michael, Mayan, Summer Red, Prima, Vance Delicious, Chaubattia Anupam, Chaubattia Princess and Mollies Delicious along with locally identified cultivar namely D.K. Delicious have been found very suitable for mid hills where cultivation of traditional high chill cultivars like Red Delicious or Royal Delicious has become less productive. Low chilling cultivars were very early to flower by 8th March (Schlomith) and other cultivars

Table-3. Growth, yield and quality of apricot varieties

Variety	Ht(m)	Girth (cm)	Plant Spread (m)		Fruit wt(g)	Yield (kg/pl)	TSS (°B)	Acidity (%)
			E-W	N-S				
CITH A-1	5.61	91.00	3.98	3.57	44.53	23.50	13.89	0.39
CITHA-2	4.83	84.60	2.99	3.10	23.80	18.30	13.86	0.21
CITHA-3	5.13	86.70	3.25	3.26	17.98	14.25	15.95	0.31
Afgani	3.69	58.59	2.33	2.35	21.40	9.70	14.73	0.22
Heartly	4.68	79.26	3.31	3.20	24.35	11.17	14.84	0.46
Harcot	3.32	74.05	2.24	2.21	16.28	19.75	14.45	0.55
Erani	5.18	83.30	3.72	3.61	21.19	11.45	13.43	0.43
CommonceHolly	5.64	56.40	4.27	3.76	15.55	6.85	17.34	0.39
New Castle	4.28	72.51	3.31	3.24	22.44	6.65	13.28	0.21
CD at 5%	0.76	12.24	0.54	0.52	12.45	6.34	0.75	0.22

started flowering by 22nd March (Well Spur). All these low chilling and early maturing cultivars become ready to harvest in the last week of June to first week of July. Among spur type cvs. Well Spur, Red Chief, Starkrimson, Oregon Spur and Spur Type Red Delicious and colour strain cvs. Skyline Supreme are also found good bearer and developed colour very early. The cultivars Oregon Spur, Spur Type Red Delicious, Starkrimson, Skyline Supreme, D. K. Delicious, Red Chief, Well Spur and Royal Delicious matured and were ready to harvest in 117.3, 117.5, 118.3, 118.6, 120.4, 120.5, 123.5 and 125.3 days from bloom respectively, whereas cvs. Rich-a-Red (130.7 days), Stark Spur Golden (133.5 days), Golden Spur Delicious (135.3 days), Red Delicious (135.7 days) and Golden Delicious (145 days) were found mid to late maturing (Table-4). Pollinizers such as Tydeman's Early Worcester and Red Gold are early maturing whereas Golden Spur and Golden Delicious are mid to late maturing. Crab apple like Manchurian crab is found good pollinizer for early to mid blooming cultivars. Vegetative growth parameters of different cultivars indicated that Spur type cultivars were relatively low in vigour as evaluated in terms of tree height (range 2.5-3.7 m), trunk circumferences (34.3-43.4 cm) and average tree spread (1.7-4.1m), while number of spurs per meter of twig growth were much higher (23.6- 34.7) in spur type cultivars in comparison to the non spur types. Annual shoot growth in all the cultivars evaluated ranged from 33.6cm (Schlomith) to 64.0cm (Manchurian crab).


Starkrimson


Oregon Spur

Starkrimson and Oregon Spur loaded with high quality fruits

Table 4. Physico-chemical, harvesting time and yield characteristics of some recommended and superior apple cultivars

Cultivar	Fruit set under open pollination (%)	Fruit weight (g)	Fruit length (cm)	Fruit dia. (cm)	TSS (^{0}B)	Acidity (%)	Fruit Colour (Score)	Starch iodine test (Score)	DFBH	Yield (kg/ tree)
Schlomith	74.9	169.5	6.4	6.9	11.4	0.54	3.2	4.4	98.7	64.0
Mayan	62.9	162.1	6.3	6.9	11.6	0.52	3.8	4.7	101.3	61.0
Michael	65.0	159.9	5.8	6.5	11.1	0.52	3.5	4.6	101.0	63.3
Vance Delicious	37.2	190.5	7.1	7.7	12.5	0.40	4.0	5.0	110.3	75.3
Mollie's Delicious	38.6	180.8	7.3	8.1	12.1	0.42	3.5	4.8	114.0	73.6
Prima	41.4	177.8	6.5	7.4	11.1	0.54	3.4	4.5	113.7	88.0
Summer Red	40.1	185.8	7.2	7.6	11.2	0.55	3.5	4.7	113.0	81.5
Chaubattia Anupam	39.5	171.0	6.9	7.2	12.3	0.36	3.4	4.8	114.0	85.3
Chaubattia Princess	37.4	172.3	6.6	7.0	12.8	0.35	3.3	4.6	113.2	80.2
Well Spur	38.7	190.1	7.2	7.7	12.6	0.37	4.0	5.5	123.5	73.6
Starkrimson	39.5	188.5	7.2	7.4	12.6	0.43	4.0	5.2	118.3	78.0
D K Delicious (Local Selection)	41.7	185.4	6.7	7.7	12.4	0.46	3.3	5.2	120.4	73.0
Spur Type Red Delicious	37.4	183.0	6.6	6.9	12.6	0.36	4.0	5.3	117.5	76.3
Sky Line Supreme	37.2	187.0	6.7	7.5	12.7	0.37	4.0	5.1	118.6	81.0
Oregon Spur	36.9	185.9	7.4	7.8	12.9	0.39	3.8	5.0	117.3	82.0
Red Chief	37.2	193.2	7.1	7.6	12.9	0.37	4.0	5.0	120.5	72.0
Royal Delicious	32.5	185.4	7.2	7.8	12.3	0.42	3.4	5.1	125.3	74.3
Rich-a -Red	36.6	184.6	6.6	7.2	12.2	0.40	4.0	5.2	130.7	70.4
Red Delicious	33.5	189.7	7.2	7.6	12.4	0.44	3.4	5.2	135.7	73.7
ManchurianCrab	82.3	40.3	2.2	2.6	8.1	0.58	4.0	2.4	116.8	61.3
Tydeman's Early Worcester	45.4	174.7	6.7	7.2	11.5	0.42	4.0	4.5	109.3	71.5
Red Gold	46.7	121.0	5.3	6.0	11.7	0.32	4.0	5.1	111.4	75.6
Golden Spur Delicious	49.0	188.2	7.1	7.7	12.6	0.35	3.6	5.3	135.3	72.3
Stark Spur Golden	47.0	184.7	6.8	7.6	12.7	0.37	3.8	5.4	133.5	69.6
Golden Delicious	42.2	199.0	7.4	8.0	13.0	0.39	3.3	5.7	145.0	66.0
$C_{(0.05)}$	2.40	1.60	0.12	0.15	0.28	0.014	0.09	0.12	1.76	1.25
$SE_{(\pm mean)}$	1.20	0.77	0.05	0.07	0.14	0.01	0.05	0.06	0.87	0.62

Evaluation of Plum cultivars

Maximum plant height (2.66 m) , plant spread (2.79 m), fruit weight (78.4 g) and yield (15.85 t/ha) were recorded in Santa Rosa variety of plum. However, maximum total soluble Solids (19.3^0 Brix) was recorded in Au-Rosa variety of plum (Table-5).

Studies on improvement and production of Saffron

Under saffron improvement programme as many as 32 elite clones were evaluated for economic traits such as fresh pistil weight, dry weight, perianth size, style and stigma length and weight during 2009-2010 and identified ten

Table-5. Varital evaluation of plum genotypes during 2009-2010

Name of variety	Plant height (m)	Plant spread (m)	Plant girth (cm)	Fruit weight (g)	Fruit length (mm)	Fruit dia. (mm)	Yield t/ha	TSS (⁰ Brix)
Santa Rosa	2.66	2.79	22.00	78.4	49.30	50.80	15.85	17.50
Kubio-Plum	1.62	1.00	13.00	8.61	23.24	23.80	5.00	8.30
Methely	1.75	2.76	19.50	12.47	25.08	25.07	8.00	11.06
Au-Rosa	1.87	1.62	15.50	85.18	52.73	52.01	12.35	19.3
Krassivica	1.25	1.00	12.50	14.32	31.30	31.33	2.40	12.28
Kanto-5	2.0	1.62	13.00	38.80	40.39	40.37	8.00	15.32
Green Gauge	2.07	2.32	17.00	24.26	35.15	32.96	7.00	18.18
MeriPosa	2.52	2.63	23.00	53.12	43.15	44.09	6.00	12.18
Black Beauty	1.75	1.00	13.00	68.18	48.26	46.57	6.53	18.62

best clones namely CITH-125 (4.1 kg/ha), CITH-S-123 (4.0 kg/ha), CITH-S-124 (3.90 kg/ha), CITH-S-122 (3.80 kg/ha) and CITH-S-1277 (3.80 kg/ha, CITH-S-121 (3.7 Kg/ha), CITH-S-107 (3.7 Kg/ha), CITH-S-120 (3.5 Kg/ha), CITH-S-104 (3.4 Kg/ha) and CITH-S-117 (3.4 Kg/ha) having high saffron yield / hectare in their initial planting year(Table-6).

Table – 6. Evaluation of saffron clonal selections for growth and yield

Selections	Foliage length (cm)	No. of leaves	Perianth length (cm)	Stigma length (cm)	Style length (cm)	Pistil length (cm)	Fresh wt. of pistil (mg)	Dry wt. of pistil (mg)	Saffron yield (kg/ ha)
CITH-S-125	25	22	5.6	3.8	1.8	5.6	40.5	8.2	4.1
CITH-S-123	26	22	7.0	4.5	1.9	6.4	40.2	8.0	4.0
CITH-S-124	27	20	6.2	3.9	1.5	5.4	39.5	7.9	3.9
CITH-S-122	25	20	6.5	4.0	1.8	5.8	37.5	7.6	3.8
CITH-S-12	24	27	6.4	3.4	2.4	5.8	38.8	7.76	3.8
CITH-S-121	24	22	6.8	4.2	1.5	5.7	37.2	7.4	3.7
CITH-S-107	27	29	7.5	4.0	2.4	6.4	37.8	7.5	3.7
CITH-S-120	22	28	5.7	3.9	1.8	5.7	35.5	7.0	3.5
CITH-S-104	26	13	6.8	3.7	2.1	5.8	33.9	6.9	3.4
CITH-S-117	24	22	6.2	3.3	2.1	5.4	34.5	6.8	3.4
CITH-S-112	18	14	6.4	3.0	2.2	4.2	33.8	6.7	3.3
CITH-S-113	22	24	6.2	3.2	1.8	5.0	32.5	6.5	3.2
CITH-S-119 (Tetra Stigma)	16	25	4.2	3.0	1.2	4.2	32.5	6.5	3.2
CITH-S-118	18	26	5.8	3.2	2.0	5.2	34.3	6.5	3.2
CITH-S-10	24	22	5.5	2.9	2.1	5.0	32.5	6.5	3.2
CITH-S-103	22	16	6.3	3.1	2.2	5.3	32.1	6.4	3.2
CITH-S-43	27	16	6.2	3.2	2.1	5.3	32.0	6.4	3.2
CITH-S-114	19	22	5.8	3.4	1.9	5.3	32.0	6.2	3.1
CITH-S-115	18	18	4.9	3.2	2.0	5.2	31.0	6.0	3.0
CITH-S-105	24	17	6.5	3.1	2.2	5.3	31.0	6.0	3.0
CITH-S-106	21	21	6.9	3.4	2.6	6.0	29.4	6	3.0
CITH-S-102	22	14	6.5	3.1	2.3	5.4	29.3	6.0	3.0
CITH-S-108	22	18	6.2	3.4	2.2	5.6	29.5	5.9	2.9

Selections	Foliage length (cm)	No. of leaves	Perianth length (cm)	Stigma length (cm)	Style length (cm)	Pistil length (cm)	Fresh wt. of pistil (mg)	Dry wt. of pistil (mg)	Saffron yield (kg/ ha)
CITH-S-11	18	19	6.2	3.3	2.4	5.7	28.2	5.64	2.9
CITH-S-116	23	18	5.4	2.9	2.1	5.0	30.0	5.8	2.9
CITH-S-13	19	18	6.7	3.4	2.1	5.5	29.0	5.8	2.9
CITH-S-101	28	15	6.2	3.7	2.0	5.7	28.6	5.7	2.9
CITH-S-3	22	19	6.2	3.4	2.3	5.7	28.0	5.6	2.8
CITH-S-111	18	17	5.2	3.2	1.7	4.9	27.8	5.4	2.7
CITH-S-110	17	19	5.8	2.8	1.8	4.6	27.0	5.2	2.6
CITH-S-76	24	18	5.9	3.2	2.2	5.4	26	5.2	2.6
CITH-S-109	19	21	5.5	2.7	1.7	4.4	25.6	4.6	2.3

Variability for stigma length and floral traits in saffron

Development of superior varieties / hybrids in solanaceous crops

A total of 14 selections were made in previous year from different crosses based on different fruits characters. They were evaluated during 2009-10 under protected conditions where yield varied from 56.60 in Sel-1 to 252 q/ha in Sel-8. The next best selection was Cap-Sel-11 (232.20 q/ha).

Capsicum selection -8

Capsicum selection -11

Promising hybrids/varieties identified on the basis of varietal/hybrid evaluation in different vegetable crops

Programme	No of varieties / hybrids evaluated	Promising varieties and hybrids identified
Tomato varieties (AICRP)	7	DVRT-2, Roma, PAU-2374, CO-3, VTG-86
Tomato hybrids (AICRP)	9	COTH-2, BCTH-4
Tomato hybrids (CITH)	12	CITH-TH-1, CITH-TH-2, SH-TH-1, CITH-TH-3
Chilli Varieties (AICRP)	11	SH-KC-12, AKC-406
Chilli hybrids (AICRP)	17	VNR-332
Chilli Selections (CITH)	380	CITH-SEL-77, CITH-SEL-39, CITH-SEL-112, CITH-SEL-22, CITH-SEL-349, CITH-SEL-252, CITH-SEL-69, CITH-SEL-71, CITH-SEL-211, CITH-SEL-222, CITH-SEL-224, CITH-SEL-276, CITH-SEL-143, CITH-SEL-246, CITH-SEL-233

Chilli germplasm evaluation

Performance of exotic vegetables under Kumaon hill conditions

Under this project broccoli varieties KTS-1, Palam Vichitra, Punjab Broccoli, Palam Kanchan and Aishwarya; Knol khol varieties Winner and Tender Knob and Parsley variety Moss curled were collected and evaluated under open field conditions at Kumaon hills. Maximum yield (165 q/ha) in broccoli was recorded in Punjab Broccoli-1. In knol khol variety Winner recorded 134.68 q/

Broccoli Variety Palam Vichitra

Knol Khol Variety Winner

Parsley Variety Moss curled

ha yield while Parsley variety Mos Curled yielded 259.60 q/ha. The experiment is in progress with more number of varities and hybrids.

Collection and varietal evaluation of garlic and onion genotypes under long day conditions at Mukteshwar

Varietal trials on garlic and onion were conducted at CITH-RS, Mukteshwar during rabi season of 2008-09. Cloves/seedlings were planted at spacing of 15 X 10 cm^2 and 15x 20 cm^2 in bed of 2.25 X 2.00 m^2. All the recommended cultural practices were followed while raising the crop. Observations were recorded one month after curing and after cutting of foliage for different grades of bulb and yield (marketable and total yield both). Percentage grades of bulb were recorded on the basis of weight. The results indicated that in garlic, the entry AVTG-9 recorded the highest bulb yield (160.98 q/ha) followed by AVTG-8 (145.88 q/ha) while in onion the entries AVT-II-0-3 recorded the highest yield (404.5 q/ha) followed by AVT-II-0-2 (333.33q/ha).

Collection, evaluation and identification of carrot genotypes suitable to temperate region

Total sixty five genotypes of carrot were evaluated during 2009-10 for Kumaon region. The performance of these genotypes is presented in Table 7. Plant height of different genotypes ranged from 19.40 to 34.20 cm. The maximum plant height was recorded in genotypes CITH-C-151and minimum in Imperator. Leaf number ranged from 6.00 to 11.67. Genotype CITH-C-Sel 5 had maximum leaf number whereas genotype CITH-C-33 OSB, CITH-C-151, CITH-C-20, Pusa Yamdagini and Early Market had minimum leaf number. Average root weight was found maximum (71.60 g) in genotype CITH-C-12, however, the same was minimum (12.00 g) in Imperetor. Among the genotypes evaluated, the highest yield (358.00q/ha) was recorded in genotypes CITH-C-12 and the minimum yield (60q/ha) was recorded in genotypes Imperator.

Diversification with off-season high value vegetables

Six varieties of Broccoli, 7 of Lettuce, 3 of Chinese cabbage, 2 of Parsley, 3 of celery, 2 of artichoke, 4 of asparagus, 4 of pran and 34 of kale were introduced and evaluated. Among the

Field evaluation of high value vegetables

Table-7. Performance of top ten carrot genotypes

Sl. No.	Genotypes	Plant height (cm)	leaf No.	Av. root wt g	yield kg/m2	yield q/ha
1	No.286	25.10	7.7	63.6	3.18	318
2	CITH-C-136	27.87	6.7	61.2	3.06	306
3	CITH-C-LOCAL BLACK	29.13	10.3	60.4	3.02	302
4	CITH-C-CHAMMAN	29.23	8.0	59.2	2.96	296
5	CITH-C-YELLOW	25.23	7.3	61.6	3.08	308
6	CITH-C-12	28.40	7.0	71.6	3.58	358
7	CITH-C-90 OSB	31.40	8.0	65	3.25	325
8	CITH-C-105	25.73	8.7	60.8	3.04	304
9	CITH-C-132	29.53	10.0	55.6	2.78	278
10	CITH-C-33 OSB	25.33	6.0	58.4	2.92	292

Table-8. Performance of high value exotic vegetables crops and best varieties under diversification project

S.No.	Crops	No. of varieties/ hybrids	Yield range (q/ha)	Best varieties/hybrids (yield q/ha.)
1	Lettuce	7	105.650 to 273.82	LS-2 (273.82) Iceberg (264.69) Bogambo (211.36)
2	Kale	34	107-643	SH-K-28 644) SH-K-30 (597) CITH-K-6 (531) SH-K-29 (525)
3	Parsley	2	116-264	CITH-P-4 (264.6)
4	Celery	2	118-227	Ford Hook (227.8)
5	Chinese Cabbage	3	851-920	CITH-CC-3 (920.40)
6	Pran	4	121-144	CITH-Pran-1 (144.94) CITH-Pran-4 (143.94)
7	Broccoli	6	79-237	Green head (237.30) Palam Samridhi (177.60) Palam Haritika (169.54)
7	Artichoke	2	60-95	CITH Green (95)
8	Asparagus	4	35-46	CITH-A-1 (46)

varieties LS-2 and Iceberg of lettuce, SH-K-28 SH-K-30, CITH-K-6 and SH-K-29 of kale, CITH-P-4 of parsley and Ford Hook of Celery, CITH-CC-3 of Chinese Cabbage, CITH-P-1 and CITH-Pran-4 of pran, Green Head and Palam Samridhi of Broccoli, CITH Green of artichoke and CITH-A-1 of asparagus.were found promising (Table-8). Seed of promising varieties of lettuce (9.5kg), celery 8.9kg) and parsley (7.9kg) was multiplied for distribution and popularization in valley.

Inter-varietal crosses in apple for development of superior cultivars/hybrids

Before initiation of systematic crossing programme, initial crossing between varieties was made to check the pollen compatibility of some of the important apple varieties The results in Table-9, indicated that cultivar Red Fuji set good fruits with majority of varieties crossed. Highest fruit set was recorded when Golden Delicious crossed with Oregon Spur while Oregon Spur did not set fruits with Vista Bella, Red Chief, Cooper IV, Silver Spur, Vance Delicious, and Top Red. Besides crosses, 26 apple variants were also collected from the valley and they are being evaluated for their quality and other attributes. Based on preliminary information a Line x Tester crossing involving divergent but adopted cultivars has been initiated in the year 2010 and is in progress.

Evaluation of gerbera genotypes under protected conditions

At Mukteshwar a total of fifty different lines of gerbera were collected from private nursery and evaluated during 2008-2009The growth and flowering characteristics of promising lines of gerbera genotypes are shown in following Table-10. Among the lines the genotypes G-16, G-17, G-18 and G-20 were found promising.

At Srinagar, during 2009-10, ten germplasm lines were evaluated for growth, flowering and yield characteristic under Poly house condition. Among the cultivars Dune, Rosalin and Dana Ellen yielded maximum flower per plant .while cv. Dune ,Salvadore and Winter Queen recorded maximam plant height. Stalk length was found to be maximum (68.47 cm) in cv.Dune and it was also good in respect of vase life in preservative solution. In the first year trial, among all the cultivars Dune and Dana Ellen expressed longest vase life (16.30 and 15.53 respectively) followed by Carambola, Kayak and Winter Queen. The vaselife of flower also increased with increase in

Table-9. Cross combinations and per cent fruit set in apple

Crosses (Female X Male)	Percent fruit set	Crosses (Female X Male)	Percent fruit set
Golden Delicious x Oregon Spur	82.5	Oregon Spur X Red Fuji	28.0
Golden Delicious X Red Chief	55.0	Oregon Spur X Mollies Delicious	22.0
Golden Delicious X Silver Spur	Nil	Red Fuji X Vista Bella	46.0
Silver Spur X Red Chief	Nil	Red Fuji X Silver Spur	40.0
Silver Spur X Gold Spur	16.0	Red Fuji X Starkrimson	30.0
Silver Spur X Oregon Spur	Nil	Red Fuji X Red Gold	34.0
Silver Spur X Vance Delicious	Nil	Red Fuji X Top Red	40.00
Silver Spur X Vista Bella	30.0	Red Fuji X Oregon Spur	52.00
Silver Spur X Royal Delicious	14.00	Red Fuji X Red Chief	20.00
Silver Spur X Red Delicious	Nil	Red Fuji X Mollies Delicious	62.00
Silver Spur X Top Red	Nil	Top Red X Red Fuji	22.00
Vista Bella X Red Fuji	40.0	Top Red X Gold Spur	30.00
Vista Bella X Silver Spur	12.0	Top Red X Starkrimson	14.00
Vista Bella X Cooper IV	12.00	Top Red X Red Chief	Nil
Vista Bella X Oregon Spur	Nil	Top Red X Silver Spur	01
Vista Bella X Red Chief	Nil	Top Red X Oregon Spur	Nil
Vista Bella X Red Spur	Nil	Top Red X Vance Delicious	Nil
Vista Bella X Vance Delicious	Nil	Top Red X Vista Bella	Nil
Oregon Spur X Vista Bella	Nil	Vance Delicious X Top Red	Nil
Oregon Spur X Red Chief	Nil	Vance Delicious X Mollies Delicious	Nil
Oregon Spur X Cooper IV	Nil	Vance Delicious X Oregon Spur	36.0
Oregon Spur X Silver Spur	Nil	Vance Delicious X Red Chief	28.0
Oregon Spur X Vance Delicious	Nil	Vance Delicious X Vista Bella	32.0
Oregon Spur X Vista Bella	Nil	Vance Delicious X Red Fuji	Nil
Oregon Spur X Top Red	Nil	Vance Delicious X Top Red	Nil

Table - 10. Growth and flowering characters of promising lines of gerbera for cut flower production under protected conditions of Kumaon hills

S. No.	Genotype	Days to flower induction	Plant Height (cm)	Leaf length (cm)	Leaf breadth (cm)	No. of leaves	Stem length (cm)	Flower diameter (cm)
1.	G-6	90.5	8.5	13.25	5.85	11.50	38.54	7.5
2.	G-15	70.85	20.54	20.14	10.8	17.5	42.58	10.6
3.	G-16	98.54	16.85	16.25	8.57	18.65	56.25	13.5
4.	G-17	110.33	20.89	22.47	8.25	19	66.25	14.41
5.	G-18	69.68	20.54	24.25	13.11	21.52	45.33	13.44
6.	G-19	110	13.98	18.87	8.65	11.87	42.74	11.52
7.	G-20	90	16.74	22.11	8.65	12.85	69.23	14

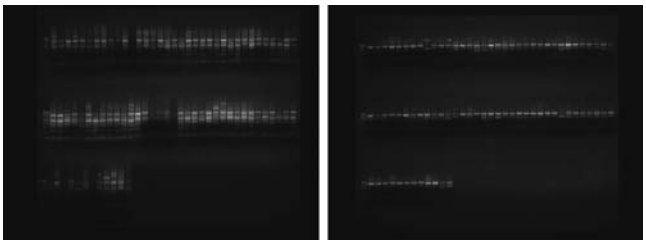
Gerbera under poly house at CITH, Srinagar

stem length. It varied from 10.58 to 16.30 days in 60 cm stem length among the cultivars mainly due to varietal characteristic. The experiment will be repeated this year for validation of results.

DNA finger printing of apple, walnut and apricot

DNA has been isolated and purified from 24 genotypes of apricot, 88 genotypes of walnut and 90 genotypes of apple. Work on further characterization using RAPD and SSR markers is under progress.

In-vitro corm multiplication of saffron



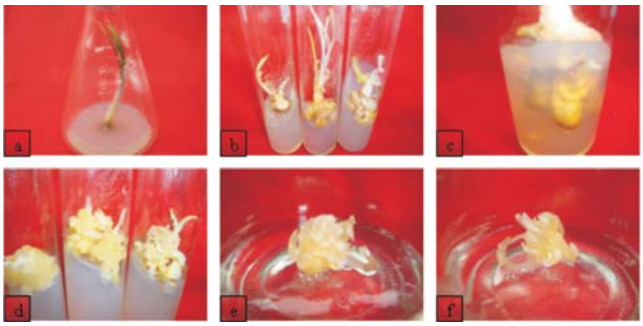
Primer OPA-1 Primer OPJ-1

RAPD profile of walnut genotypes

Among different explants cultured on different culture media, differential, response was observed with respect to type of response. Explants like eye buds showed development of single shoots after 20 days of culture which further form well developed shoots with leggy appearance after 35 days of culture. Sub-culturing on the same medium showed regeneration of one or two cormlets from the main explants after 20 weeks of culture. Maximum size (1.3g) of micro-corms were obtained on LS media supplemented with 21.6 *µM* NAA and 22.2 *µM* BA followed by 1.2 g on MS media supplemented with 21.6 *µM* NAA and 22.2 *µM* B.A. Shoots were generated from ovaries, small corms, and eye buds. Shoots when cultured on half strength Murashige and Skoog (MS) medium containing BAP and NAA developed 2 cormlets per shoot with an average fresh mass of 1.3 g. A total of eight months are required to harvest a cormlets from eye bud which otherwise takes 22 months under field conditions.

In vitro proliferation of stigma-like structures

Varied response was observed with respect to medium and explant used. Highest response (60%) was observed with half ovaries on G-5 media supplemented with 27 *µM* NAA and 44.4 *µM* BA followed by 55% on LS media with 27 *µM* NAA and 44.4 *µM* BA. Some explants formed new stigma-like structures under the conditions of BA and NAA in combinations; style when used as an explant form undifferentiated callus and show undifferentiated enlargement of explants, ovaries gave rise to shoot primordia and some times form shoots, eye buds gave rise to shoots with leggy appearance and also produce mico-corms, half ovaries proliferated into direct-type and indirect-type stigma-like structures. The new structures resembled each other in their shapes and tone of color, although there were two types, direct and indirect. The direct formation of stigma-like structures from the explant occurred early but the numbers of structures were few (10-20), while indirect ones appeared later; the meristematic/callus like/



a) Shoot formation from eye bud; b) Leaf primordial, callus and shoot formation from ovaries; c)Micro-corm formation from eye bud; d) Indirect SLS regeneration from half ovaries; e) Direct regeneration of SLS from half ovoaries; and f) Direct regeneration of SLS from half ovaries

somatic embryo like, tissues first appeared on the explant, and then many primordia were formed on that tissue which developed into many stigma-like structures (SLS). Maximum number (120 indirectly and 20 directly) and size (5.2 cm) of SLS were obtained in G-5 medium supplemented with 27 *µM* NAA and 44.4 *µM* BA followed by 100 indirectly and 20 directly and 4.5cm long on LS medium supplemented with 27 *µM* NAA and 44.4 *µM* BA. The growth of tissue, primordia, and stigma-like structures was slow but the number of formed stigma-like structures was much larger in the latter case (maximum 120 per one half ovary) than in the former. Work for micro-propagation of walnut, and apple is under progress.

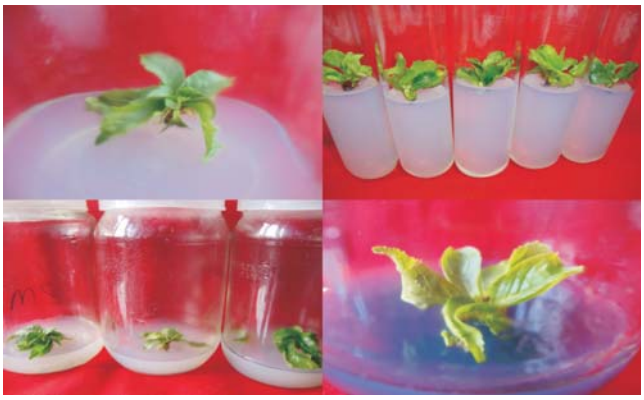
Fast and efficient micro-propagation protocol for *Lilium longiflorum*

The optimum response in terms of percentage of explants producing bulblets was recorded on MS medium supplemented with BA 2.0 mgl^{-1} + NAA 0.5 mgl^{-1} where 94.0 % of the explants regenerated bulblets and the bulblets were regenerated without any visible callus formation as an intermediate step. The number of shoots per explant was significantly higher 22.0 with BA 2.0 mgl^{-1} + NAA 0.5 mgl^{-1} as compared to other treatments. A different effect of growth regulators, under similar environmental conditions was observed on length of shoots and fresh weight of regenerated bulblets. The highest shoot length (12 cm) and highest mean fresh weight of 365 mg was observed on MS medium supplemented with 2.0 mgl^{-1} BA + 0.5 mgl^{-1} NAA. Among different rooting treatments, MS medium supplemented with 2 mgl^{-1} NAA gave best results and explants cultured on this medium recorded highest rooting (93%). Also the number of roots (19) and length of roots (5.2 cm) was higher than other treatments **(**Fig). The rooted bulblets were hardened in coco peat and soilrite: sand (1:1 w/v) in plastic pots (Fig) and the survival of bulblets was significantly higher in coco-peat (95%) as compared to soilrite: sand after 8 weeks of transfer. This study on *in vitro* mass multiplication of *Lilium spp*. revealed that large number of high quality plant material of *Lilium* can be achieved in a very short period of time (6 months). The planting material derived through tissue culture techniques using bulb scales as explant, show uniformity with respect to different quality parameters of the plant. Also the planting material will have the least chances of viral and other disease infestation.

In-vitro propagation of *Lilium longiflorum*

Micropropagation protocol for cherry

The rootstock Mazzard showed better response than Mahaleb with respect to shoot length, number of shoots developed and leaf number per explants to the treatment combinations used. It was observed that with the increase in concentration of BA shoot multiplication rate increased, that shoot production decreased as BA concentrations decreases. The best multiple shoot initiation was obtained on the MS medium supplemented with



In-vitro multiplication of cherry root stocks

BA at 1 or 2 mgl-1, with a average shoot number of 5.7 ± 1.02 and 5.2 ± 1.00 in Mazzard and 5.4 ± 0.62 and 5.0 ± 0.60 per explant, in Mahaleb respectively, on the 30th day of culture. Readymade shoot multiplication media showed good response to shoot multiplication with 4.8±0.98 shoots per explants in Mazzard and 4.6±0.86 in Mahaleb root stock.

Crop Production

Large scale multiplication of quality planting material and seeds of temperate horticultural crops

Quality rootstock/seedling production

A total of 1.24 lakh clonal /seedling rootstocks of apple (MM – 106, EMLA – 106, EMLA-26, MM-111, M.9, M.26, M.27, B-9, Alnar), cherry (Colt, Mazzard, Mahaleb, seedling), peach, plum, walnut, apricot and almond seedlings have been produced and have are being used for budding and grafting with elite commercial varieties.

Quality planting material through budding and grafting

About 56000 plants of elite varieties were produced during 2009-10 through budding, grafting, cutting, layering etc. Tweleve thousand in apple, almond (25000 Nos.) pear (3000 Nos.) cherry (3000 Nos.), apricot (5000 Nos.) plum (2000 Nos.), peach (3000 No) strawberry (20000) and 3000 in walnut . Most of the saleable material has been supplied to Horticulture Departments of J&K, H.P. Uttarakhand, Arunachal Pradesh, Tamil Nadu and farmers of the region. Besides root stock and budded / grafted plants, a large quantity of bud wood/ scion wood (2.50 lakhs) was also produced and distributed to State Departments, nursery men and farmers and also used in grafting and budding.

At Regional Station Mukteshwar during 2009-2010 a total of 10,000 grafted plants of apple cultivars Oregon Spur, Starkrimson, Skyline Supreme, Red Chief, Vance Delicious, Mollies Delicious, Top Red, Well Spur, Spur Type Red Delicious, Red Gold, Golden Delicious, Golden Spur, Tydeman's Early and other cultivars were produced and distributed to local farmers and KVKs in Uttarakhand. Bud wood of superior apple and peach cultivars were also distributed to farmers. Multiplication of apple clonal rootstocks such as MM-106, MM-111 and M-9 is also in progress for production of high quality planting material of apple cultivars.

Production of quality seeds / seedlings of improved vegetable varieties / hybrids of commercially important vegetable crops

To popularize new varieties and hybrids a total quantity of 2.80 kg hybrid seed of cucumber, brinjal, chilli, capsicum, tomato and onion was produced, seedlings raised and distributed to farmers under HTM project. In addition 488 kg breeder/quality seeds of tomato, brinjal, capsicum, chilli, cucumber, pea, beans, spinach, carrot, cabbage, radish and onion were also produced for supply to development departments and farmers. For early raising of crops, 1.7 lakh seedlings of different summer and rabi vegetable

Quality planting material production in open and polyhouse condition

crops were also raised in polyouses and distributed to kitchen gardeners and farmers.

Production of quality planting material of saffron

A total of 15q of corms of saffron were planted following recommended package of practices in the field during 2007-2008 for production of quality planting material of saffron. One lakh corms were harvested in august, 2009. These were slurry treated with Carbendazim @ 3g/kg seed, shade dried and supplied to growers. The remaining beds of saffron are being maintained for production of saffron corms which will be harvested in June-July, 2010 for supply of quality planting material to growers under HTM.

Standardization of efficient propagation technique for production of quality planting material of walnut

To standardize the most suitable scion wood, environmental conditions and grafting techniques an experiment with different scion types were grafted using wedge and tongue at different timings under three environmental conditions. Three scion types namely, top, middle and botton with 3-4 buds and two grafting techniques (wedge & tongue) were evaluated at four different dates (15 February, 01 March, 15 March, 01 April) under three environmental conditions (Polyhouse, Polytrench & open field). Among scion types the scion wood taken from middle portion recorded highest grafting success (90%) in wedge graft under polyhouse conditions done during middle

Table-11. Grafting success as influenced by scion type and environmental conditions

Method of grafting	Date of grafting	Scion part used	Open Field		Poly House		Poly Trench	
			% Scion stick sprouted	% Grafting success	% Scion stick sprouted	% Grafting success	% Scion stick sprouted	% Grafting success
Wedge grafting	15.02.2010	Top	44.4	8.88	52.22	23.33	47.77	23.33
		Middle	52.22	14.44	65.55	32.22	63.33	30.00
		Bottom	45.55	10.00	57.77	26.66	53.33	22.22
	01.03.2010	Top	51.11	12.22	64.44	43.33	66.66	32.22
		Middle	64.44	18.88	77.77	56.66	80.00	50.00
		Bottom	52.22	14.44	66.66	46.66	63.33	36.66
	15.03.2010	Top	57.77	14.44	68.88	50.00	64.44	43.33
		Middle	67.77	23.33	94.44.	**90.00**	86.66	67.77
		Bottom	60.00	15.55	76.55	57.77	70.00	50.00
	01.04.2010	Top	46.66	10.00	65.55	38.88	50.00	26.66
		Middle	62.22	17.77	75.55	54.44	63.33	41.11
		Bottom	45.55	11.11	64.88	43.33	48.88	25.55
Tongue grafting	15.02.2010	Top	46.66	8.88	48.88	20.00	44.44	22.22
		Middle	54.44	16.66	57.77	27.77	60.00	31.11
		Bottom	46.66	11.11	45.55	25.55	44.44	23.33
	01.03.2010	Top	54.44	13.33	61.11	41.11	64.44	32.22
		Middle	66.66	17.77	73.33	46.66	70.00	43.33
		Bottom	56.66	14.44	63.33	37.77	60.00	35.55
	15.03.2010	Top	61.11	13.33	66.66	47.77	65.55	43.33
		Middle	75.55	21.11	82.22	74.44	76.66	64.44
		Bottom	56.33	16.66	70.00	54.44	66.66	52.22
	01.04.2010	Top	55.55	8.88	54.44	31.11	52.22	28.88
		Middle	52.22	18.88	68.88	43.33	64.44	41.11
		Bottom	50.00	10.00	52.22	34.44	54.44	31.11

of March. Among , different times of grafting, 15th March was best date for maximum graft success. Among different environments low cost polyhouse or polytrench were found ideal environmental condition for maximum success due to better humidity and ideal temperature than open field (Table-11).

Standardization of medium density orcharding in almond on seedling root stocks

Three indigenous (Makhdoom, Shalimar and Waris) and six exotic (Non Pareil, Merced, Pranyaj, Primorskij, California Paper Shell, IXL) varieties were planted at the spacing of 4.0 x 4.0 m, accommodating 625 plant/ha as against 278 plant/ha in conventional method. Trunk cross section area of tree, fruit number and kernel recovery were maximum in Non Pareil variety. However, nut yield (4.245 kg/tree) and yield (2.65 t/ha) was recorded in Pranyaj variety of almond (Table-12) followed by Non Pariel (2.22 t/ha) in eight year old plantations.

Standardization of medium high and high density orcharding in almond

Three almond cultivars namely Makhdoom, Waris and Shalimar budded on seedling rootstocks were planted at three different spacings viz., 2.5x2.5m (1600 pl/ha) 3 x 3m (1111 pl/ha) and 3.5x3.5m (816 pl/ha). The maximum cross sectional area of tree, nut number and yield per tree were maximum in the spacing of 3.5x3.5m. However, yield per hectare was maximum in 3x3m spacing (Table-13) yielding as high as 1.91 t/ha for cv Waris followed by Makhdoom (1.87t/ha) and Shalimar (1.69t/ha) in 5 year old plantations.

High density almond plantation variety Waris

Energy harvest through plant architectural engineering for increasing source and sink relationship in apple

Different training systems such as Espalier, Cordon, Spindle Bush, Modified Central Leader, Central Leader, Head and Spread and Vertical Axis have been developed and observation on flowering, growth and fruiting are being recorded and analyzed on different varieties. The results are quite encouraging.

Maturity indices for apple cultivars in Uttrakhand

Cultivars viz., Vance Delicious, Oregon Spur, Starkrimson, Red Chief, Royal Delicious, Gala

Table-12. Evaluation of almond varieties for yield and quality of almond under medium density (4m x 4m spacing)

Varieties	TCA (cm^2)	No of nuts/tree	Nuts yield (kg/tree)	Yield (t/ha)	Kernel recovery	Shell softness
Makhdoom	69.75	1575.37	2.020	1.26	53.50	Soft shelled
Shalimar	82.44	1475.45	2.030	1.27	56.62	papery
Waris	94.32	687.42	1.980	1.23	52.97	Soft shelled
Pranyaj	111.12	2264.23	4.245	2.65	59.91	Soft shelled
Primorskij	88.02	1060.87	2.430	1.51	55.07	Papery
Merced	107.82	1511.65	3.132	1.95	63.48	Papery
IXL	40.30	391.63	0.822	0.51	43.47	Soft shelled
Non Pareil	111.47	2355.24	3.559	2.22	65.69	Papery
California paper shell	58.04	273.89	1.080	0.67	42.92	Papery
CD at 5%	35.37	545.45	1.250	0.84	7.32	-

Table-13. Growth and yield of almond varieties under different density

Cultivars	Density	TCA (cm^2)	Nut Number	Nut yield (kg/tree)	Nut yield (t/ha)
Makhdoom	2.5x2.5m (1600 pl)	52.99	657.45	1.12	1.79
	3x3m(1111 pl)	72.23	816.87	1.69	1.87
	3.5x3.5m(816 pl)	74.06	1258.23	2.28	1.86
Shalimar	2.5x2.5m(1600 pl)	60.64	508.65	0.90	1.44
	3x3m(1111 pl)	79.12	820.12	1.53	1.69
	3.5x3.5m(816 pl)	89.88	1134.47	2.07	1.67
Waris	2.5x2.5m(1600 pl)	78.45	501.36	0.99	1.58
	3x3m(1111 pl)	79.21	820.25	1.72	1.91
	3.5x3.5m(816 pl)	80.10	1012.56	2.22	1.81
CD at 5%		12.89	345.34	0.67	1.45

Espalier

Vertical Axis

Cordon

Different training systems in apple

Mast, Red Delicious and Golden Delicious attained harvest maturity in 110, 117, 117, 120, 120, 125, 132 and 145 days FBH, respectively. All the superior cultivars attained more than 70% skin red colour except Golden Delicious which attained yellow to golden yellow as indicator for ready to harvest stage. As the harvesting was delayed the fruits were affected by Sooty blotch and fly speck, russetting and cracking which may be due to prevailing high rain fall, high humidity and foggy weather.

Integrated nutrient management in high density apple plantation under different mulching

Integrated combination of FYM, vermicompost and inorganic fertilizers at different proportions (Table-14) were applied on plants of 7 year old apple cv. Strkrimson. All the treatments improved plant growth over the previous years i.e. 5th and 6th years(Table-15). Fruit quality parameters were also improved especially by treatment of 70 kg FYM+16kg vermicompost+ inorganic fertilizers under leaf mould, followed by black polythene mulch. However, 7th year was the low fruit yield year which is a genotypic expression of apple cultivars and this trend of low yield is alternated by high yield in the next year. Therefore in the 8th year doses of integrated nutrient combinations have been increased keeping in view the expected high yield. The usefulness of Vermicompost as organic manure is significant and it not only supplements inorganic fertilizer requirement, but also reduces the voluminous requirement of FYM. Mulching with leaf mould or black polythene was also found beneficial.

Rain water harvesting and *in-situ* moisture conservation techniques for almond under Kashmir Karewas

The water harvesting techniques like full moon, half moon, cup and plate and trench system were created during December, 2008 along with different type of mulch materials for efficient moisture conservation and utilization under rainfed conditions. A control plot was also kept for comparison in the field. The experiment has been laid out in factorial randomized block design

Table-14. Integrated nutrient combination for the 7th year apple plantations

Treatment	Mulch material	Organic manures		Inorganic fertilizer(g)		
		FYM(kg)	Vermicompost(kg)	N	P_2O	K_2O
T_1	Black polythene	70	0	490	245	490
T_2	Leaf mould	70	0	490	245	490
T_3	No mulch	70	0	490	245	490
T_4	Black polythene	70	11	160	135	325
T_5	Leaf mould	70	11	160	135	325
T_6	No mulch	70	11	160	135	325
T_7	Black polythene	70	16	10	85	250
T_8	Leaf mould	70	16	10	85	250
T_9	No mulch	70	16	10	85	250
T_{10}	Black polythene	35	21	140	175	350
T_{11}	Leaf mould	35	21	140	175	350
T_{12}	No mulch	35	21	140	175	350

Table-15. Blooming behaviour, fruit set and plant growth parameters of 7th years old apple trees of cv. Starkrimson under different integrated nutrient and mulching treatments

Treat-ment	Fruit set (%)	Fruit weight (g)	Fruit length (cm)	Fruit dia. (cm)	TSS (%)	Acidity (%)	Plant height (m)	Trunk circum-ference (cm)	New shoot growth (cm)	Yield (Kg/ tree)
T_1	30.2	193	7.4	7.5	12.5	0.41	2.4	6.5	66.3	3.2
T_2	26.5	194	7.1	7.4	12.3	0.43	2.4	6.6	66.4	3.7
T_3	23.2	175	6.2	6.9	11.3	0.46	2.3	6.2	60.5	1.3
T_4	28.4	188	7.6	7.9	12.6	0.35	2.5	6.7	74.4	3.6
T_5	28.0	197.5	7.8	8.1	12.8	0.33	2.6	6.9	77.4	3.7
T_6	25.7	176.2	6.9	7.2	10.8	0.42	2.1	5.9	69.5	1.6
T_7	33.1	198.6	7.9	8.4	13.3	0.34	2.7	6.7	69.5	3.1
T_8	29.2	202	7.7	8.2	13.6	0.33	2.8	6.7	73.0	3.8
T_9	26.4	179	6.6	7.0	11.7	0.38	2.2	6.3	68.5	2.0
T_{10}	32.0	192	7.3	7.7	13.5	0.33	2.7	6.6	72.3	3.8
T_{11}	30.0	200.4	7.7	8.0	13.4	0.32	2.6	6.8	70.5	3.7
T_{12}	22.5	176.6	6.1	6.7	10.9	0.40	2.3	5.8	63.8	2.4

with four replications using almond variety Non Pareil planted at a spacing of 4 x 4m. The data on nut yield and soil moisture status indicated that maximum fruit number and yield (2355 Nos, 3.56 kg/tree and 2.22t/ha) were recorded in full moon structure + plastic mulch followed by half moon + plastic mulch (2267 Nos, 3.45 kg/tree 2.16 t/ha) and minimum in control (894 Nos 1.28 kg/tree 0.80 t/ha) (Table-16) plots. The soil moisture status was recorded from fruit set to maturity at 0-30 cm depth revealed that the maximum soil moisture content (15.75%) was recorded in full moon structure + plastic mulch followed by half moon + plastic mulch (15.67%) and minimum in control (11.23%) during April,09 and similar trend was observed in subsequent months during growth and development of nuts.

Integrated nitrogen management on yield and quality of almond and soil properties

The organic manure, FYM and fertilizers were applied as per the treatment in almond

Table-16. Effect of water harvesting techniques and mulching on nut yield of almond

Treatment	No of nuts/tree	Nuts yield (kg/tree)	Yield (t/ha)
Half moon	1732.23	2.16	1.35
HM+Organic mulch (OM)	2098.89	3.21	2.00
HM+ Plastic mulch (PM)	2167.42	3.45	2.16
Trench	1350.47	2.27	1.42
Trench+OM	1635.12	2.48	1.55
Trench+ PM	2127.25	3.01	1.88
Cup& Plate	1285.32	1.48	0.93
Cup& Plate +OM	1565.78	2.22	1.38
Cup& Plate + PM	1725.45	2.56	1.60
Full moon	1840.69	2.61	1.63
Full moon +OM	2139.23	3.17	1.98
FM+PM	2355.24	3.56	2.22
Control	894.36	1.28	0.80
Control+ OM	1072.47	1.68	1.05
Control+ PM	1118.77	1.98	1.24
CD at 5%	645.45	0.75	0.45

Cup and plate system

Full moon system

Half moon system

Trench system

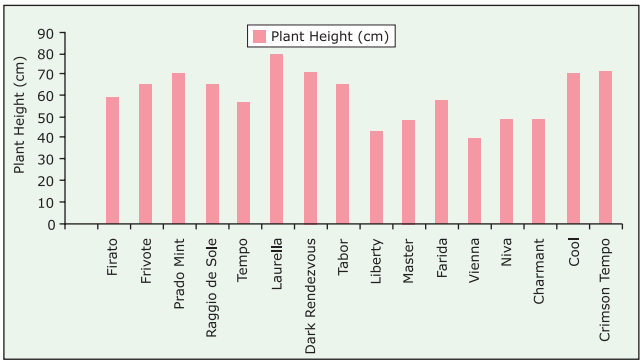
experimental field during February, 2009. The treatment comprised of T_1-Control, T_2- 50% RDF of nitrogen, T_3- 75% RDF of nitrogen, T_4-100 % RDF, T_5- 125% of RDF, T_6-50% RDF + 20t FYM/ha, T_7-75% RDF + 15tFYM/ha, T_8-100% RDF + 10TFYM/ha , replicated thrice under RBD. The preliminary observations indicated that maximum nut number (723) and nut yield (1.45 kg/tree) were recorded in treatment T8 and minimum in control (494 nut number and yield 0.89 kg/tree) in variety Waris.

Characterization of soil and nutritional survey of temperate fruits like apple and almond

To assess various physiochemical characteristics of almond growing areas, the almond growing soil were surveyed and collected 165 soil samples from different locations of Pulwama and Budgam Districts of Kashmir Valley. These samples were processed and analyzed for pH, EC and organic carbon content. The work on analyses of available NPK, sand, slit and clay of the soil samples is in progress for finalization and drawing of the conclusions.

Standardization of cost-effective production technology for cut flower production in carnation

Sixteen genotypes of carnation (*Dianthus caryophyllus*) namely, Firato, Prado Mint, Master, Liberty, Charmant, Niva, Laurella, Tabor, Dark Rendezvous, Raggio de sole, Frivote, Tempo, Farida, Vienna, Crimson Tempo and Cool were evaluated under low cost polyhouse for different characters suitable for cut flower production. The data revealed that all the genotypes differed significantly with respect to growth and flowering parameters (Table-17). Earliest flower bud induction was recorded in cv. Frivote while



Mean plant height of different cultivars of carnation under low cost polyhouse

Table-17. Flowering characters of carnation cultivars under low cost polyhouse

S. No.	Genotypes	Days to Flower induction	Stemlength (cm)	Flower diameter (cm)	Vase-life (days)
1.	Firato	138.00	26.33	8.06	7.00
2.	Frivote	162.00	26.66	8.10	7.00
3.	Prado Mint	135.33	31.33	6.50	7.66
4.	Raggio de Sole	177.33	32.33	11.33	8.33
5.	Tempo	170.00	22.00	7.00	6.33
6.	Laurella	171.66	41.00	7.26	8.33
7.	Dark Rendezvous	141.33	34.00	7.03	7.66
8.	Tabor	138.33	35.00	7.16	8.33
9.	Liberty	146.66	35.00	8.53	8.00
10.	Master	143.66	40.33	8.63	16.00
11.	Farida	146.66	27.66	8.33	10.00
12.	Vienna	180.66	21.66	5.83	7.33
13.	Niva	146.33	22.66	6.83	12.00
14.	Charmant	159.33	41.33	7.30	14.00
15.	Cool	130.52	35.25	6.54	7.25
16.	Crimson Tempo	135.68	45.25	7.87	8.24

cv.Vienna took maximum number of days for flower bud induction. Cultivar Laurella, Crimson Tempo, Dark Rendezvous and Cool recorded maximum plant height (Figure) while cv. Niva and Master were found to bear maximum number of flowers/m^2. Cultivar Farida recorded largest flower diameter (10.23 cm) whereas stalk length was found to be maximum (45.25 cm) in cv. Crimson Tempo. Master was found superior with respect to vase-life of flowers. Experiment was laid out for refinement of production technology under low cost polyhouse. All the cultural operations have been performed on time and the data recording is under progress.

Standardization of organic agro-techniques for peach under high density planting system

Among the various treatment combinations, the treatment comprising Vermi-compost+ mycorrhiza resulted into better vegetative growth during the period under study, which was closely followed by treatment comprising Nadep + mycorrhiza and FYM + Mycorrhiza. The physico-chemical attributes of fruits were also analyzed, which revealed the highest TSS in treatments FYM+Mycorrhiza and Vermi-compost+ Mycorrhiza, while the maximum total sugars were recorded in treatment comprising FYM+ Mycorrhiza followed by Nadep (Table-18 and 19).

Quality organic peach fruits

Development of model for organic baby corn production and its fodder value evaluation

Baby corn was planted under different organic treatments during 2009. Cob weight, baby corn weight and yield in different treatments is presented in following figures. maximum number of cobs weight and yield was recorded in treatment $T_{2.}$

Protected cultivation of vegetables

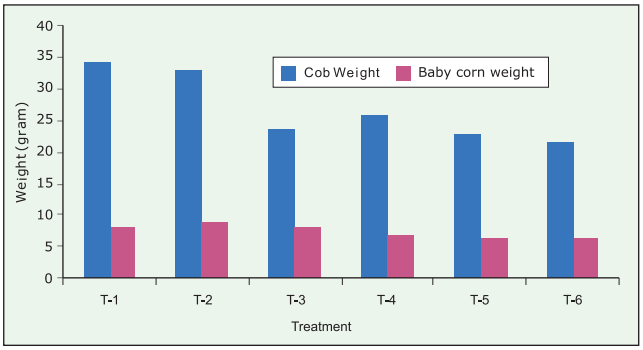
For obtaining early crop and extending the availability of vegetables, the high value crops

Table-18. Performance of peach under various organic nutrient management regimes

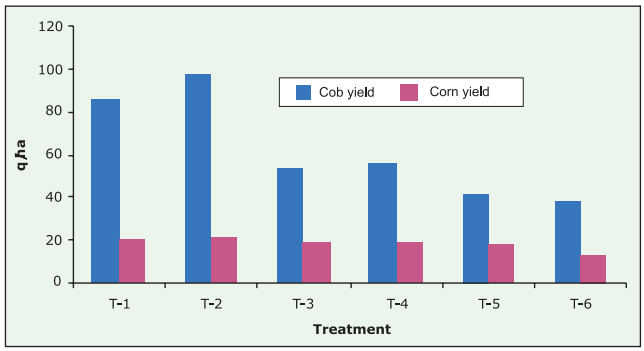
S. No.	Treatment	Date of complete leaf fall	Pruned weight (kg)/ plant	Trunk girth increment (cm)	Av. yield/ plant (kg)	Date of 50% flower opening	Date of last flower opening	Fruit set (%)
1.	FYM	06.11.09	9.42	1.79	2.73	05.03.10	15.03.10	57.33
2.	Nadep	05.11.09	11.27	1.98	2.89	02.03.10	11.03.10	58.80
3.	Vermi-compost	10.11.09	11.19	1.83	1.32	04.03.10	08.03.10	63.71
4.	Mycorrhiza	08.11.09	9.88	2.08	2.79	23.02.10	30.02.10	68.00
5.	FYM+Nadep	10.11.09	11.51	2.11	2.58	24.02.10	05.03.10	67.05
6.	FYM+ Vermi	09.11.09	10.84	2.05	3.81	27.02.10	05.03.10	63.35
7.	FYM+ Myco	15.11.09	12.43	2.17	2.47	25.02.10	01.02.10	58.47
8.	Nadep+ Vermi	09.11.09	9.87	2.30	2.32	30.02.10	08.03.10	57.89
9.	Nadep+ Myco	18.11.09	13.38	2.41	3.75	21.02.10	27.02.10	68.62
10.	Vermi+ Myco	17.11.09	14.75	2.76	2.13	23.02.10	29.02.10	72.36
11.	Conventional	10.11.09	10.38	2.27	2.34	02.03.10	11.03.10	75.64

Table-19. Physico-chemical characteristics of peach fruits

S. No.	Treatment	Av. fruit weight (g)	Pulp: stone	TSS (°B)	Acidity (%)	Ascorbic acid (mg/ 100 g)	Reducing sugars (%)	Total sugars (%)
1.	FYM	74.1	14.70	11.5	1.04	10.5	2.79	3.26
2.	Nadep	68.57	12.43	12.0	0.84	17.5	3.22	5.08
3.	Vermi-compost	74.58	18.20 mom	13.0	1.06	17.5	2.69	6.07
4.	Mycorrhiza	71.26	17.05	14.0	1.04	17.0	3.00	4.03
5.	FYM+Nadep	68.38	13.75	10.5	0.79	25.0	2.48	3.65
6.	FYM+ Vermi	79.82	12.93	11.7	0.80	25.0	3.55	4.73
7.	FYM+ Myco	83.49	13.08	15.4	0.80	27.5	2.95	7.45
8.	Nadep+ Vermi	73.50	11.21	14.4	0.97	40.0	2.83	4.40
9.	Nadep+ Myco	83.64	19.58	14.3	0.94	43.2	3.09	4.43
10.	Vermi+ Myco	85.96	18.16	15.4	1.0	33.7	2.63	4.37
11.	Conventional	69.53	12.13	13.4	1.21	20.0	3.21	3.49



Cob and corn weight in different organic treatment



Cob and corn yield in different organic treatment

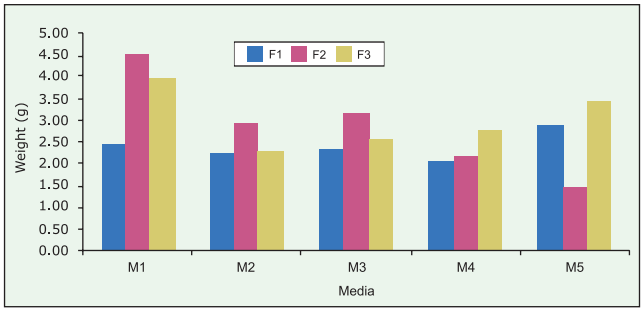
T_1= FYM (9.6 kg/bed) + Biospirillum (10ml/kg of seed) + Biophos (10ml/kg of seed) + biopotash (10ml/kg of seed); T_2= Vermi (1.92 kg /bed) + Biospirillum (10ml/kg of seed) + Biophos (10ml/kg of seed) + biopotash (10ml/kg of seed); T_3= Leaf Mould (5 kg/bed) + Biospirillum (10ml/kg of seed) + Biophos (10ml/kg of seed) + biopotash (10ml/kg of seed);T_4= Vermi (1.92 kg /bed) + FYM (9.6 kg/bed)+ Biospirillum (5ml/kg of seed) + Biophos (5ml/kg of seed) + biopotash (5ml/kg of seed); T_5= Vermi (1.92 kg/bed) + leaf mould (5 kg/bed) + Biospirillum (5ml/kg of seed) + Biophos (5ml/kg of seed) + biopotash (5ml/kg of seed); T_6= FYM (9.6 kg/bed) +Leaf mould (5 kg/bed) + Biospirillum (5ml/kg of seed) + Biophos (5ml/kg of seed) + biopotash (5ml/kg of seed)

Organic baby corn production under Kumaon hill conditions

like tomato, capsicum and cucumber, were raised under protected low cost polyhouses. Four varieties and four hybrids of capsicum were evaluated in polyhouse with two different spacings (20x50 and 30x50) and three types of prunning (single stem, double stem and natural). In spacing 20x50, hybrid NS-284 and Bombay without pruning and variety SH-SP-406 with single stem showed highest yield and in spacing 30x50, Shalimar capsicum hybrid-1 with single stem and variety California Wonder without prunning showed highest yield. In cucumber four varieties and four hybrids were evaluated in polyhouse in which NSX-2 (78.0 t/ha) and

Tomato and capsicum under protected cultivation

SH-CH-1(54.0 t/ha) and SH-CH-5 (53.2 t/ha) performed better with single and two branches than unprunned plants. In tomato, among 11 varieties and 6 F1's tested on three training systems (single stem, double stem and unprunned) evaluated in polyhouse, NS-6677 (53.2t/ha) with double stem training followed by Heem Sona (52.1t/ha) with same training system gave the highest yield.



Effect of fertiizer dose and media on fresh weight of plant

Standardization of techniques for plug plant production in ornamentals

To standardize the media and NPK requirement for plug plant production in Fuchsia, five different combinations of media and 3 NPK combinations were tested in a completely randomized design. Days taken for root induction ranged from 20.67 to 25.11 days. Medium M5 which is composed of Sand+Peatmoss+FYM+Forest litter (1:1:1:1) recorded earliest rooting (Table-20) while root length was found maximum in medium containing Peatmoss +Perlite+Vermiculite::3:1:1 (M2) with a fertilizer dose of N-P-K: 12-10-1 (F3). Fresh weight of plug plants was found maximum in medium M1 containing peatmoss +perlite (3:1) with a fertilizer dose of N-P-K: 12-1-1 (F2) as presented in Figure.

Table-20. Effect of media composition and NPK dose on days to root induction and length of roots during plug plant production of *Fuchsia*

Treatments	Days to root				Root length (cm)			
	F1	F2	F3	Mean	F1	F2	F3	Mean
M1	24.33	25.33	24.33	24.67	6.18	8.04	10.02	8.08
M2	23.33	23.67	23.33	23.44	10.45	9.95	11.90	10.77
M3	23.67	24.00	23.67	23.78	8.42	8.61	8.39	8.47
M4	25.33	24.67	25.33	25.11	8.92	7.61	9.10	8.54
M5	20.33	21.33	20.33	20.67	6.96	7.99	10.56	8.50
Mean	23.4	23.8	23.40	23.53	8.19	8.44	9.99	8.87

Effect of media composition and NPK dose on fresh weight of plug plants during plug plant production of *Fuchsia*

Plug plant production in Fuchsia

Standardization of agro techniques for quality cut-flower and corm production of gladiolus

Effect of plant geometry and NPK dose were studied for quality spike and corm production. Earliest sprouting (16.72 days) was observed in T2 and T10 (20X25 cm^2, 30:20:20g/m^2 and 30X30 cm^2, 20:10:10g/m^2 however, days taken to heading was recorded earliest (89 days) in T3 and T4 (20X25 cm^2, 40:30:30g/m^2 and 25X25 cm^2, 20:10:10 g/m^2). Longest spike (112.22 cm) was recorded in T6 (25X25 cm^2, 40:30:30g/m^2) while T10 (30X30 cm^2, 20:10:10 g/m2) recorded highest number of florets. However, durability of spikes was found greatest in T3 (20X25 cm^2, 40:30:30g/m^2). Efficacy of different bio-agents as well as plant growth regulators was also studied for corm and cormel production. Inoculation of bio-agents in the soil significantly enhanced corm and cormel production. Average weight of corm was recorded to be maximum in T6 (*Trichoderma viride*+BAP 100 ppm) whereas weight of cormel per plant was found maximum in T5 (*Trichoderma viride*+GA3 100 ppm). Number of corm and cormels per plant was also found to increase by addition of *Trichoderma viride*.

Crop Protection

Management of chilli wilt

The field trial on the effect of root dip and soil drenching with chemicals/biocontrol agents on chilli wilt was conducted during the year 2009-10. The disease caused by Fusarium pollidoroseum is endemic in valley conditions of Kashmir. About 40 days old seedlings of chilli variety Kashmiri Long-1 raised in polyhouse were root dipped in respective chemical/ biocontrol agent and transplanted in field. In each treatment, 10 plants replicated in three rows each were planted. A total of nine treatments including check namely Carbendazim 0.05% (T1), Carbendazim 0.1% (T2), Mancozeb 0.2% (T3), Mancozeb 0.3 % (T4), Carbendazim 0.05 % + Mancozeb 0.2 % (T5), Trichoderma viride 20g per plant, with 2g/100ml for dip (T6) Trichoderma viride 30 g per plant with 3 g/100ml for root dip (T7) and T8 as check (1 Litre water) were used following was randomized block design. Normally, the symptoms of wilt get initiated by end of July or first week of August in valley conditions of Kashmir. In first fortnight of July, 2009 the chilli plants were drenched with respective chemical/ biocontrol agent @ 1 Litre preparation of chemical/biocontrol agent per plant.

The plants were examined for development of wilt symptoms. The severity of wilt symptoms was recorded as 0 = no wilt, 1 = initiation of wilt, 2 = rolling and drooping of leaves in about 30 % plant, 3 = rolling rolling and drooping of leaves in about 60% plant, 4= rolling and drooping of leaves in about 80% plant and 5 = whole plant including fruits wilted. The

Effects of Chemical/bioagent on chilli wilt

Percent Disease Index for each treatment was calculated employing the formula:

$$PDI = \frac{\text{Sum of numerical values} \times 100}{\text{No. of plants observed} \times \text{Maximum disease rating}}$$

The percent disease mitigation as compared to percent disease index of check was also calculated using the formula:

$$\text{Percent Disease Mitigation} = \frac{C-T}{C} \times 100.$$

The details of percent disease index and percent disease mitigation calculated in different treatments are given in Table 21. The maximum disease mitigation i.e. 60.4 percent was recorded in T_5 (Carbendazim 0.05 % + Mancozeb 0.2 %) followed by 42.4 percent in T_2 (Carbendazim 0.1%) and 40.2 percent in T_7 i.e. in drenching with *Trichoderma viride* 30g /plant with 3g/100 ml for root dip.

Effect of biocontrol agents and biofertilizers on corm rot of saffron

The corm rot of saffron (*Fusarium oxysporum f. sp. gladioli*) is becoming a serious problem in successful cultivation of saffron in Kashmir conditions. A trial on effect of biocontrol agents and biofertilizers on corm rot under field conditions was conducted to find out a suitable bioagent for its management under *karewa* conditions of Kashmir. Saffron being the costliest spice of the country, it is imperative to use bioagents instead of fungicides for its management. Hence, for management of corm rot, the slurry treatment

Untreated

Treated

Table-21. Effect of root dip and soil drenching with chemicals/bio-control agents on chilli wilt (*Fusarium pallidoroseum)* under Kashmir conditions during 2009

Treatment	PDI* = Sum of numerical values x 100 / No. of plants observed x Max. rating	Per cent diseasemi-tigation C-T x100 / C
T1 = Carbendazim 0.05%	69.3 (56.4)	35.9
T2 = Carbendazim 0.1%	53.3 (46.9)	42.4
T3 = Mancozeb 0.2%	72.0 (58.1)	22.2
T4 = Mancozeb 0.3%	62.0 (51.9)	33.0
T5 = Carbendazim 0.05% + Mancozeb 0.2%	36.6 (37.2)	60.4
T6 = *T.viride* 20g/plant 2g/100ml for dip	65.3 (53.9)	29.4
T7 = *T.viride* 30g/plant 3g/100ml for dip	55.3 (48.0)	40.2
T8 = CHECK	92.6	- (74.5)
C.D (P 0.05) C.D	4.4 (P 0.01)	— 6.1

**Angular transformation values in parentheses*

to saffron corms with respective bioagents was applied. The treatments were Tricho XP (*T.virideI) 5g/kg* (T_1); Funginil (*T.viride*) 5g/kg (T_2); Sudocel (*Pseudomanas florescens*) 5g/kg (T_3); *Azotobacter sp.* 5g/kg (T_4); *Azospirillum sp.* 5g/kg (T_5) and T_6 as check.

The observations were recorded on healthy plant stand and flowering in each treatment, which are given in Table-22. Among the six treatments, the maximum plant stand of 55.7 percent was recorded in T_1 (Tricho XP-*T.viride,* 5g/kg) followed by T_4 (*Azotobacter sp.*5g/kg) i.e. 49.6 percent. The flowering too was recorded maximum i.e. 34.8 percent in T_1 (Tricho XP- *T.viride,* 5g/kg) followed by T_4 (*Azotobacter sp.,* 5g/kg) i.e. 27.2 percent as compared to 33.4 percent plant stand and 18.2 percent flowering in check.

Biological control of white grub

Using biocontrol agents (entomopathogenic fungi) viz. *Beauveria bassiana, Beauveria brongniartii* and *Metarrhizium anisopliae* different experiments were conducted for control of white grub.

a. *In-vitro* evaluation of *Beauveria brongniartii* for entomopathogenicity to white grub adults: The spore suspension of *Beauveria brongniartii* prepared in three concentrations i.e. 10^6, 10^7 and 10^8 spores per ml was sprayed on the beetles of *Holotrichia consanguinea* kept in moist chambers. After 8 days, the beetles sprayed with spore suspension of 10^8 spores per ml concentration showed immovability/mortality of 90 per cent along with colonization of beetles by the fungus. At lower concentration of 10^7 and 10^6 spores per ml, the mortality was 60 and 40 percent, respectively. By 14th day all of the beetles in every concentration had died and were colonized by the fungus (Table-23).

b. Evaluation of *Beauveria bassiana* against white grub in pots: An experiment in pots was laid down in the month of January, 2009

Table-22. Effect of bio-control agents on corm rot of saffron under field conditions during 2009

Treatment		Av. percent plant stand	Av. per cent flowering
T_1 = TRICHO XP (*T.viride*)	5g/kg	55.7	34.8
T_2 = FUNGINIL (*T.viride*)	5g/kg	48.5	24.9
T_3 = SUDOCEL (*P. florescens*)	5g/kg	39.4	23.9
T_4 = *Azotobacter sp*.	5g/kg	49.6	27.2
T_5 = *Azospirillum sp*.	5g/kg	45.2	21.8
T_6 = CHECK		**33.4**	**18.2**

Table-23. *In-vitro* evaluation of bio agent *(Beauveria brongniartii)* against white grub (*Holotrichia consanguinea*) adults

Days (post treatment)	% mortality in different treatments			Mean
	$T_1(10^8)$	$T_2(10^7)$	$T_3(10^6)$	
2	0.0	0.0	0.0	0.0
4	20.0	10.0	0.0	10.0
6	50.0	30.0	20.0	33.3
8	90.0	60.0	40.0	63.3
10	90.0	80.0	60.0	76.6
12	100.0	100.0	80.0	93.3
14	100.0	100.0	100.0	100.0

in which each pot was filled with soil and FYM. The grubs were collected from the field and were placed at the rate of 10 grubs in each pot. Each pot was treated with formulation of *Beauveria bassiana* prepared on the maize meal-sand medium. Three treatments of this formulation were given at the rate of 2g /pot, 4g/pot and 6g/pot along with check of untreated pots. Each treatment was replicated five times. The pots were kept at the ambient temperature. The observations on mortality and colonization of grubs were recorded during summer in June, 2009. The particulars given in table showed that application of *Beauveria bassiana* preparation in maize meal-sand medium at the rate of 6g/pot resulted in maximum mortality i.e. 40 percent due to *B.bassiana* and only 28 percent grubs survived in pots (Table-24).

c. Trap catches of white grub adults in apple, almond and walnut: The light traps were installed in the vicinity of orchards of apple, almond and walnut for light trapping of adults of white grub just after appearance in second fortnight of June (Table-25). The average number of beetles trapped were 8.7, 6.0 and 3.8 per day per trap in apple, almond and walnut, respectively and highest number of beetles trapped in a day was 16 for apple, 13 for almond and 9 for walnut.

d. Mass multiplication of bio agents: The efforts for multiplication of *Beauveria bassiana* and *Metarrhizium anisopliae* on FYM and rice straw in trench culture is in progress using rice straw (two inches) followed by FYM (two inches) layers 6 each i.e. 12 layers were made in a trench. Each layer was inoculated with formulation of required entomopathogenic

Table-24: Evaluation of *Beauveria bassiana* against with grub in pots

Treatment	Av. natural mortality (%)	Av. mortality due to *Beauveria bassiana* (%)	Per cent survival
T_1 (2g/pot)	30.0	12.0	58.0
T_2 (4g / pot)	38.0	22.0	40.0
T_3 (6g /pot)	32.0	40.0	28.0
T_4 (Check)	40.0	-	60.0

Table-25. Trap catches of white grub adults in apple, almond and walnut in June – July, 2009

Days	Catches/trap			Total
	T_1(Apple)	T_2(Almond)	T_3(walnut)	
1	2	2	0	4
2	7	4	1	12
3	9	6	3	18
4	13	7	4	24
5	14	8	5	27
6	16	11	7	34
7	16	13	8	37
8	13	9	9	31
9	12	6	6	24
10	9	6	4	19
11	7	5	4	16
12	6	5	3	14
13	4	4	3	11
14	2	3	1	6
15	1	1	0	2
Total	131	90	58	279
Mean	8.7	6.0	3.8	6.2

Mass multiplication of entomopathogenic fungi on different media

fungus prepared on maize meal-sand medium. The inoculated layers were finally covered with transparent polythene. The preliminary observations of trench cultures indicated that the trench culture of *Beauveria bassiana* has been successful while some quantity of *Metarrhizium anisopliae* has also been multiplied for field application.

Studies on efficacy of Kresoxim methyl against apple scab in Kashmir conditions

The apple trees were already sprayed with 1.50 percent horticultural mineral oil during second fortnight of March, 2009 for sanjose scale/mite control and subsequently sprayed with 0.06 percent Dodine in first fortnight of May, 2009 for primary scab control. Two sprays of Kresoxim methyl @ 0.03 percent and 0.05 percent as well as Hexaconazole @ 0.05 percent were applied in second fortnight of May and first fortnight of June in the orchard for management of secondary scab infection along with unsprayed check. In each treatment, five replications of four trees each were maintained following randomized block design.The secondary scab infection on 50 leaves of ten terminal shoots per tree was recorded by the end of July, 2009. The disease incidence data was analysed statistically and the details of disease incidence and percent disease control ($\frac{C-T}{} \times 100$) are given in Table-26. In variety Benoni, spray of 0.05 percent Kresoxim methyl resulted in minimum infection of terminal leaves i.e. 1.20 percent followed by 2.10 percent terminal leaf infection with spray of 0.03 percent Kresoxim methyl and 7.30 percent terminal leaf infection with 0.050 percent Hexaconazole spray as compared to 33.70 percent terminal leaf infection in check. In variety Red Gold also minimum infection of terminal leaves i.e. 1.30 percent was recorded with spray of 0.05 percent Kresoxim methyl followed by 3.60 percent terminal leaf infection with 0.03 percent spray of Kresoxim methyl and 9.20 per cent terminal leaf infection in trees sprayed with 0.05 percent Hexaconazole as compared to 39.30 percent terminal leaf infection in check. Similar trend was recorded in variety Golden Delicious i.e. minimum terminal leaf infection (1.40 percent) resulted with spray of 0.05 percent Kresoxim methyl followed by 3.60 percent terminal leaf infection with spray of 0.03 percent Kresoxim methyl and 8.20 percent terminal leaf infection in trees sprayed with 0.05 percent Hexaconazole as compared to 38.90 percent terminal leaf infection in check. In all of

Field experiment on management of apple scab

the three apple varieties maximum percent disease control was recorded with spray of 0.05 percent Kresoxim methyl followed by 0.03 percent Kresoxim methyl and 0.05 percent Hexaconazole. The percent disease control of terminal leaf infection was 93.76, 90.83 and 90.74 percent in Benoni, Red Gold and Golden Delicious, respectively with 0.03% Kresoxim methyl spray (Table-26).

The fungicide (Kresoxim methyl 50% SC) was also evaluated on apple variety Golden Delicious for phytotoxic symptoms, if any as foliar spray in three concentrations i.e. 0.05%, 0.1% and 0.2% along with recommended dose of hexaconazole i.e. 0.05% and check (water).

Table-26. Efficacy of kresoxim methyl 50% SC (Ergon 44.3% W/W SC) against development of apple scab in Srinagar conditions during the year 2009-2010

Treatment	Av. Percent infection of terminal leaves*			Percent disease control $\frac{C-T}{C} \times 100$		
	Benoni	Red gold	Golden Delicious	Benoni	Red gold	Golden Delicious
T_1 =Kresoxim methyl 0.03%	2.10 (8.22)	3.60 (10.82)	3.60 (10.82)	93.76	90.83	90.74
T_2= Kresoxim methyl 0.05%	1.20 (6.18)	1.30 (6.08)	1.40 (6.66)	96.43	96.69	96.40
T_3 = Contaf (Hexaconazole) 0.05%	7.30 (15.32)	9.20 (17.60)	8.20 (16.58)	78.33	76.59	78.92
T_4 = CHECK	33.70 (35.46)	39.30 (38.82)	38.90 (38.58	-	-	-
C.D (p 0.05)	**2.26**	**1.89**	**1.43**	-	-	-
C.D (p 0.01)	**3.18**	**2.65**	**2.00**	-	-	-

*Angular transformation values in parentheses

The sprayed trees of all the five treatments were observed for appearance of phytotoxic symptoms viz. Necrosis, Vein clearing, Yellowing, Wilting, Hyponasty and Epinasty in the foliage upto 15 days after spray. None of these symptoms on foliage were discernible (Table-27). It shows that all of the treatments of foliar spray with Kresoxim methyl as well as standard check hexaconazole were not phytotoxic to apple as foliar spray under Srinagar conditions.

Studies on gummosis of stone fruits and its management

Almond varieties planted at the institute experimental farm are being observed for symptoms of gummosis during dormant period in winter season. The infected portion of the stem is being scrapped and pasted with chaubattia paste to avoid further spread. The surveys for its incidence in farmer's orchards and isolation studies are being taken up.

Bio-efficiency of miticides against apple mites

Second year field trial was continued in an apple orchard near Mukteshwar on cv. Red Delicious of 15-20 years age to test the bio-efficacy of acaricide Sedna 5SC (Fenpyroximate 5%SC) against the phytophagous apple mite (*Panonychus ulmi)* during 2009. All the acaricide treatments

Table-27. Effect of kresoxim methyl 50% SC (Ergon 44.3% W/W SC) on apple variety Golden Delicious for 15 days under Srinagar conditions during the year 2009-10

Treatment	Phytotoxic symptoms discernible to naked eye					
	Necrosis	Vein clearing	Yellowing	Wilting	Hyponasty	Epinasty
T_1 =Kresoxim methyl 50% SC (Ergon 44.3% W/W SC) 0.05%	ND	ND	ND	ND	ND	ND
T_2= Kresoxim methyl 50% SC (Ergon 44.3% W/W SC) 0.1%	ND	ND	ND	ND	ND	ND
T_3 = Kresoxim methyl 50% SC (Ergon 44.3% W/W SC) 0.2%	ND	ND	ND	ND	ND	ND
T_4 = Contaf 5% EC 0.05%	ND	ND	ND	ND	ND	ND
T_5 = CHECK (water)	ND	ND	ND	ND	ND	ND

ND = Not discernible

(Table-28) recorded zero mite population at 7 days after treatment though counting of mite population just before the first spray recorded on an average 3.53 to 5.10 numbers of mites/ leaf. Fenpyroximate 5% SC @ 0.005% concentration was significantly superior to all other treatments at all the intervals of observations recording 0.0 to 0.67 mites/leaf. This was closely followed by Fenpyroximate 5%SC @ 0.00375% (0.0 to 0.97 mites/leaf). Next best treatments were Fenpyroximate 5% SC @ 0.0025% (0.0 to 1.73 mites/leaf) and Dicofol 18.5%EC @ 0.037% (0.0 to 2.10 mites/ leaf). However, all the treatments were significantly superior to Control (6.43 to 11.50mites/leaf). Fenpyroximate 5%SC @ 0.00375% and 0.005 % were the best treatments for controlling European red mite, *Panonychus ulmi* (Koch) when compared with Dicofol 18.5%EC @ 0.037% during the period of trial *i.e.* 2009 under Mukteshwar condition.

Assessment of AM fungi status in apple orchards and its utilization

Two-year old potted apple plants, maintained under glass house conditions, were pre-inoculated with AM fungi (*viz*., *Sclerocystis dussi*, *Glomus intraradices, G. fasciculatum, G. bagyaraji, G. leptotichum, G. monosporum, Gigaspora margarita* and a mixed culture.) followed by stem inoculation with *Botryosphaeria ribis* in order to asses the efficacy of these AM cultures for their potential use as bio-control agents for suppression of brown stem canker disease caused by *Botyryosphaeria ribis*. The results indicated that the incidence of canker was less severe in plants inoculated with AM in comparison to non-mycorrhizal control (Table-29). Furthermore, AMF inoculation resulted in improved survival and growth of mycorrhizal plants; though, it varied by species of AM utilized.

The AM cultures were also evaluated for their efficacy to improve graft survival in apple. Apple cv. Oregon Spur grafted on MM106 rootstock were transferred to plastic pots containing sterilized potting mixture (soil, sand and FYM; 2:2:1) along with approximately 30 g AMF inoculum placed immediately below the roots. The observations were recorded 120 days after grafting of scion cv. on MM106 rootstock and found maximum graft success, shoot length, leaf number and leaf area by treatments T-7 and T-8 (Table 30 & 31)

Table-28. European red mite population on apple before and after application of Fenpyroximate 5%SC during *Kharif* 2009

Treatment	Mean number of mites/leaf before spray	Mean number of mites/leaf after spray						
		Days after first spray				Days after second spray		
		7	14	21	28*	10	20	30
0.0025% Fenpyroximate	3.80 (2.1)	0.0 (0.71)	1.46 (1.40)	1.58 (1.44)	1.76 (1.50)	0.35 (0.92)	1.17 (1.29)	1.73 (1.49)
0.00375% Fenpyroximate	3.53 (2.01)	0.0 (0.71)	0.52 (1.01)	0.73 (1.11)	0.88 (1.18)	0.00 (0.71)	0.42 (0.96)	0.97 (1.21)
0.005% Fenpyroximate	3.67 (2.04)	0.0 (0.71)	0.0 (0.71)	0.19 (0.82)	0.39 (0.94)	0.00 (0.71)	0.32 (0.90)	0.67 (1.08)
Dicofol 0.037%	4.83 (2.31)	0.0 (0.71)	1.03 (1.23)	1.49 (1.41)	1.71 (1.48)	1.03 (1.24)	1.80 (1.52)	2.10 (1.61)
Control (Distill water spray)	5.10 (2.37)	6.43 (2.63)	7.40 (2.81)	8.20 (2.95)	8.77 (3.04)	9.63 (3.18)	10.43 (3.31)	11.50 (3.46)
$CD_{(0.05)}$	0.14	0.03	0.12	0.10	0.10	0.10	0.11	0.13
SE(±)	0.05	0.01	0.04	0.03	0.03	0.03	0.04	0.04

** Second spray after counting mites/leaf.*

Figures in the parenthesis are "$\bar{x}$ + 0.5 transformed values

Table-29. Effect of AM fungi on canker size on apple seedlings inoculated with *Botryosphaeria ribis*

Treatment	Mean canker area (mm²)	Stem girdle (%)
T1	33.65	29.7
T2	63.97	58.7
T3	39.80	34.6
T4	96.53	67.3
T5	150.3	76.2
T6	126.74	81.4
T7	81.38	72.9
T8	36.43	30.5
T9 (Control)	220.42	100.0

Table-30. Effect of AM fungi on survival and growth of infected apple seedlings

Treatment	Colonization (%)		Survival (%)		No. of leaves/plant		No. of side shoots/plant		Shoot increment (cm)	
	30 days	60 days	30 days	60 days	30 days	60 days	30 days	60 s days	30 days	60 days
T1	44.6	48.8	100.0	86.9	57.2	74.1	13.2	16.3	5.4	6.7
T2	29.6	30.4	84.2	63.7	27.5	41.3	6.8	7.9	3.5	4.3
T3	41.9	44.9	100.0	82.6	60.6	72.9	9.8	13.4	5.9	6.0
T4	22.5	23.9	78.1	55.9	26.5	36.1	5.7	6.8	2.4	2.8
T5	26.7	27.2	62.5	28.7	30.5	35.3	7.0	9.3	2.9	3.1
T6	19.4	22.1	60.8	45.4	37.6	47.4	7.8	9.5	3.6	4.0
T7	23.9	25.4	78.3	57.1	18.7	30.1	4.1	6.2	2.1	2.7
T8	49.1	51.6	100.0	88.0	49.2	75.6	13.0	15.3	5.3	5.5
T9 (Control)	2.8	3.5	32.4	18.2	20.8	10.7	4.1	2.7	1.7	1.2

Table-31. Effect of AM fungi on graft success and growth of grafted apple plants

Treatment	Graft success (%)	Length of shoot (cm)	No. of leaves	Leaf area (cm²)
T1	52.6	16.3	22.5	10.3
T2	82.2	21.6	26.8	14.7
T3	50.7	21.8	31.7	10.4
T4	62.1	30.4	25.8	09.8
T5	70.4	46.9	32.5	16.7
T6	78.9	27.5	30.6	11.6
T7	80.7	24.6	40.6	25.4
T8	84.3	44.8	38.1	24.1
T9 (Control)	60.5	15.2	18.9	12.9

Post Harvest Technology

Minimal processing, packaging and storage study of fruits (strawberry, apricot and cherry) for quality maintenance and storage

Effect of Thiobendazole (TBZ) on quality maintenance of apple variety Mollies Delicious

Mollies Delicious an early variety of apple has less shelf life, quality gets deteriorated with storage time after 2 weeks of harvesting. Trial was taken to increase the shelf life of apple fruits of variety M. Delicious by treating with different concentrations of TBZ.

Post harvest treatment of fruits with TBZ (1%) for 30 seconds dip and storage at low temperature (5°C) retained its shelf life with

quality intact up to 80 days. Treated fruits showed least PLW, and retained maximum TSS (13.8° Brix) and desirable acidity (0.25%).

Effect of edible coating of Aloe vera gel and shrink wrapping on quality maintenance and shelf life of apple var. Red Chief

Late maturing variety of apple Red Chief looses its shelf life after a short period of storage. *Aloe vera* coating have been reported to increase the shelf life of various temperate fruits. A trial was taken to study the effect of *Aloe vera* gel coatings and shrink wrappings on the shelf life of the apple fruits of variety R. Chief. *Aloe vera* gel in the conc. of 1:1 and shrink wrapped in 19 micron PE film (stored at 5+1° C and RH of 85 %) retained the shelf life of fruits up to 4 months showing minimum PLW and maximum retention of TSS, acidity and ascorbic acid was found.

Effect of shrink wrapping on quality maintenance and storability of apple var. Golden Delicious

Golden Delicious a late maturing variety of apple having excellent demand in the market looses its firmness and shape even after 2 weeks of harvesting. To retain its shape and firmness and to increase its shelf life with maximum retention of quality parameters, a trial was taken to study the effect of shrink wrapping on the quality maintenance and shelf life of apple variety Golden Delicious. The fruits after harvesting and washing were treated with 1% TBZ and shrink wrapped in different thickness semi permeable PE film. Shrink wrapping in 19 micron film and treated with TBZ increased the shelf life significantly (135 days). Least PLW and maximum retention of quality in terms of TSS, acidity and ascorbic acid was recorded in case of this treatment.

Effect of Aloe vera gel coatings on the shelf life and quality maintenance of cherry

Fruits at optimum maturity stage and free from scars and defects were coated with *Aloe vera* gel in different concentrations and stored at low temperature (5°C) and room temperature to see the quality retention and shelf life. Edible coating of *Aloe vera* gel in the concentration of 1:1 and stored at L T (5°C) extended the shelf life up to 36 with least PLW (10.0%) compared with control (39.0%) with maximum vitamin C (28.0 mg/100g) compared to control (8.0 mg/ 100g) and desirable TSS 13.5 B compared with control (11.1 B)

Management of fruit cracking in pomegranate

Preharvest foliar application of different chemicals using $CaSo_4$, GA_3 and Borax indicated that minimum fruit cracking (%) was recorded with the treatments of CaSO4 2000 ppm in genotypes Jyoti (17.60), Dholka (19.93) and Kandhari(23.74) while Ca SO_4 3000 ppm found effective in Bedana (20.16) and G-137 (15.42) as compared to control (33.29, 40.45, 46.53, 39.86, 36.79). Maximum fruit size (mm) was recorded with the treatments of GA_3 80 ppm in all the genotypes i.e Jyoti, Dholka, Kandhari, Bedana and G-137 found effective as compared to control. Highest yield t/ ha was recorded with the treatment of GA_3 80 ppm in Jyoti (10.08), Dholka (12.52), Kandhari (12.64), Bedana (12.41 ton) and G-137 (9.60) as compared to control. (Table-32).

Control (cracked fruit)

$CaSo_4$ Treated (Un-cracked fruits)

Post Harvest management of temperate fruits and nuts for storage and value added products

Physico chemical characteristics of apricot varieties and their shelf life study

Fruits of eleven apricot varieties planted at CITH, Srinagar were analyzed for physico chemical characteristics and their storage life. Maximum fruit weight was recorded in var. CITH-A-1 (88.8 g) followed by CITH-A-2 (69 g). Similarly maximum size fruits were recorded in CITH-A-1 (49.53 x 56.30mm), while

Table-32. Effect of nutrient and growth regulator on fruit cracking in pomegranate under temperate condition

Treatment	Jyoti	Dholka	Kandhari	Bedana	G-137
$CaSo_4$ 2000 (ppm)	**17.60**	**19.93**	**23.74**	28.84	29.88
$CaSo_4$ 3000 (ppm)	27.12	26.43	26.53	**20.16**	**15.42**
$CaSo_4$ 4000 (ppm)	26.35	32.42	33.09	30.22	28.12
GA_3 40 (ppm)	25.16	26.85	27.81	24.03	23.93
GA_3 80 (ppm)	22.79	29.43	30.69	25.50	25.98
GA_3 120 (ppm)	22.60	27.8	28.94	27.653	28.70
Borax 25 (ppm)	27.53	27.74	33.36	26.54	25.62
Borax 50 (ppm)	23.48	27.76	31.22	26.63	27.06
Borax 75 (ppm)	27.57	30.36	33.49	30.79	27.45
Water (control)	**33.29**	**40.45**	**46.53**	**39.86**	**36.79**

maximum TSS was found in var. AT5 (25.6° B) and D-5 (23.5° B) and least acidity 0.22% in D-15. Minimum stone weight (17.0 g) was found in var.H-4. The shelf life of maximum varieties was recorded up to 16 days when stored at room temperature (RT) and 30 days in low temperature (LT). However, minimum PLW was recorded in Afghani (8.0%) and maximum in T-4 (15.1%). TSS and acidity was retained when varieties were stored at LT. However, maximum TSS and desirable acidity was recorded in CITH-A-1, H-4 Harcot, Afghani and CITH-A-2 and shelf life was retained up to 30 days compare to fruits stored at room temperature (16 days).

Effect of calcium chloride on shelf life and quality maintenance of apricot var. CITH-A-2

Post harvest dip of calcium chloride 1% after harvesting was found effective to keep the fruits firm and had least PLW. Calcium chloride treated fruits showed minimum PLW (8.1%) compared with control (15.5%) and retained maximum TSS 19.2 and desirable acidity 0.69 % while in case of control it was 0.72%

Studies on physico chemical characteristics of cherry varieties and their shelf life

Fruits of six varieties of cherry Mishri (Bigarreau Noir Grossa), Double (Bigarreau Napoleon), Lambert, Van, Bing, Stella harvested at optimum maturity stage were studied for physico chemical characteristics so that their post harvest handling and processing potential can be assessed. Maximum fruit weight (4.90 gm) was recorded in variety Lambert with maximum size (19.90 x 19.72) mm) and minimum weight of fruit (3.2 g) was recorded in var. Mishri. Maximum TSS was recorded in var. Stella (15.9° B) and in Mishri. (14.5° B) and ascorbic acid was maximum in Stella (60.2 mg/100g).

Fruits of different varieties of cherry at optimum maturity stage were washed in chlorine water, dried and packed in 250 g capacity of CFB boxes of 3 micron thickness and stored at room and low temperature (5° C) at 85 % RH. Studies conducted up to 24 days of storage revealed that min. PLW (9.0%) was recorded in var. Bing when stored at low temperature. While maximum PLW (16.0%) was recorded in Mishri and AT5. Shelf life of all the varieties was extended when stored at low temperature; however TSS and acidity was recorded maximum in Stella, Double and Bing. Thickness of the peel was recorded minimum (0.63 mm) in Stella.

Development of Technology for making osmo dehydrated products of apricot and cherry

Osmo air dried apricot products

A protocol was developed for the preparation of quality osmo dehydrated product of apricot

and cherry. Technology developed is given in the form of flow diagram.

Osmo air dried apricot products

Flow chart for preparation of osmo air dried Apricot

Mature and ripe fruit

↓

Halving of fruits and removing of stones

↓

Blanching (5 min.)

↓

Fruit kept one night in sugar syrup of 30^0 B with 1% citric acid.

↓

Adding more sugar @ 300 g/kg of prepared fruit

↓

Boiling (4 min)

↓

Mass kept for 2 days

↓

Procedure repeated (Adding sugar and boiling) End point (70^0 B)

↓

Drying in Poly tunnel for 72 hours

↓

Packing in 100g LDPE and final packing in glass jars

Osmo dehydrated product of apricot

Osmo dehydration of cherry

Flow chart for preparation of osmo air dried Cherry

Mature and ripe fruit

↓

Halving of fruits and removing of stones

↓

Blanching (5 min.)

↓

Fruit kept one night in sugar syrup of 30^0 B with 1% citric acid

↓

Adding more sugar @ 300 g/kg of prepared fruit

↓

Boiling (4 min)

↓

Mass kept for 2 days

↓

Procedure repeated (Adding sugar and boiling)

End point (70^0 B)

↓

Drying in tunnel dryer for 60 hours

↓

Packing in 100g LDPE and final packing in glass jars

Osmo dehydrated Cherry products

Value addition, storage and sensory quality evaluation of different products from major and minor temperate fruits

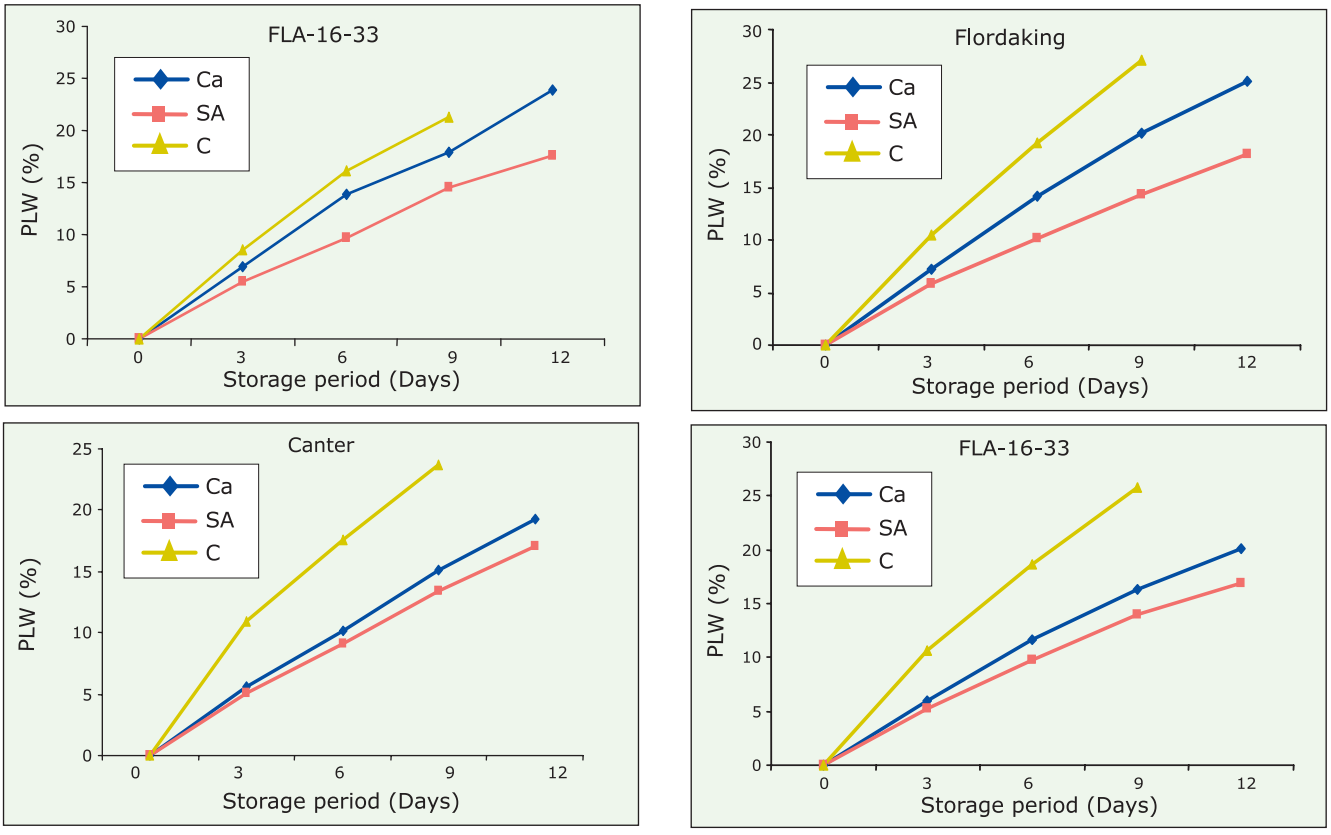
Value added products viz., juice, squash, blended squash from malta, ginger, rhododendron, galgal have been prepared as per the technical programme and are being evaluated for storage study at regular intervals

Enhancement of shelf life of different temperate fruits through post harvest chemical interventions

The different concentrations of salicylic acid and calcium EDTA were used in four cultivars of peach viz,, FLA-16-33, Flordaking, Canter and Flordasun (Table 33) to enhance the post harvest shelf life. The study carried out for 2 weeks at ambient temperature revealed that salicylic acid had significant effect in enhancing the storage life of peach with better retention of physico-chemical and quality characteristics. The PLW (%) was also recorded the lowest in the fruits treated with salicylic acid followed by Ca EDTA and control. The initial characters of the various cultivars have been given in Figure.

Table-33. Average physico-chemical characteristics of different cultivars of peach

S.No.	Characteristics	Cultivars			
		FLA-16-33	Flordaking	Canter	Flordasun
1.	Weight (g)	109.42	118.80	104.60	128.47
2.	Length (cm)	5.48	5.78	5.55	5.90
3.	Breadth (cm)	5.87	6.20	5.82	6.42
4.	Wt of stone (g)	4.95	4.75	5.21	5.98
5.	Wt of pulp (g)	87.60	95.57	85.17	105.43
6.	TSS (°B)	8.6	7.8	7.8	8.8
7.	Acidity (%)	0.59	0.65	0.66	0.62
8.	Ascorbic acid (mg/100g)	15.52	8.00	21.40	8.20



Effect of various treatments on PLW (%) in different cultivars of peach

Enhancing blooming period of tulip using PGRs and different storage periods

Among all the treatments GA3 induced early flowering and also improved stalk length. CCC delayed flowering and improved quality of flower and weight of bulbs. Among the cold storage treatments, increased storage period induced earliness in flowering. PGRs also improved the quality of flower and preservative solution (sucrose+ 8-HQS) improved the vase life of cut flower of variety Lle De France significantly.

Tulip experimental field

Study of vase life and quality in tulip

Meetings and Events

Administrative cum Laboratory Complex Inaugurated

Laboratory-cum-Administrative complex of the CITH, Srinagar was inaugurated by Hon'ble Secretary DARE and Director General ICAR, Dr. Mangala Rai, On 22nd June 2009 in presence of Dr. H. P. Singh, Deputy Director General (Horticulture), Dr. K. D. Kakote, DDG (Extension), Prof. Anwar Alam, Vice Chancellor, SKUAST (K), Dr C. D. Mayee, Chairman, ASRB and other dignitaries and guests. To commemorate the occasion, the dignitaries planted saplings in the CITH lawn. Hon'ble Secretary DARE and Director General ICAR, Dr. Mangala Rai inaugurated the building by cutting ribbon and unveiling the inaugural stone. Prof. Nazeer Ahmed, Director, CITH, welcomed all the dignitaries and briefed gathering about the Institutes facilities and the achievements. He said the Institute is working efficiently under the guidance of Director General and Dy. Director General (Hort.) and with full support of the Council and expressed that in days to come more such the facilities would be added for serving the farming community and nation more efficiently. On behalf of the CITH family, he expressed thanks to one and all who contributed directly or indirectly in the growth of this Institute. Dr. H. P. Singh, Deputy Director General, Hort., while addressing on the inaugural ceremony emphasized that technologies and varieties developed by CITH should reach to the farmers for realizing their benefits. Dr. Mangala Rai, Hon'ble Secretary

Hon'ble Secretary DARE and Director General, ICAR Dr. Mangala Rai inaugurating Lab Cum Administrative Complex

DARE and Director General ICAR, in his inaugural address expressed his satisfaction about functioning of the Institute and wished that CITH should become a leader in the field of temperate horticulture. He emphasized that the Himalayan region is rich in biodiversity and most congenial for temperate fruit crops like apple, walnut, almond, apricot, cherry etc, and the Institute should therefore specialize and take a lead role in developing varieties and technologies for

improving economic and nutritional security in the entire temperate region.

Apricot Day

An apricot day was organised on 11th July 2009 at Central Institute of Temperate Horticulture, Srinagar. Dr H. P. Singh, Deputy Director General (Hort), ICAR, New Delhi was the Chief Guest on the occasion. A large number of fruit growers and a team of Horticulture Officers from different districts of Kashmir participated in the event. The Director, Prof. Nazeer Ahmed, Emeritus Scientist- Prof Ab. Ahad Sofi and Resource Scientists of the Institute after the inauguration took the participants around the farm, high tech laboratories and poly green houses and demonstrated advance production technologies and the varieties. Water harvesting and moisture conservation techniques in karewas, role of pollinizers and pollinators, drip and sprinkler irrigation for higher water use efficiency, intercropping of legumes, vegetables and oil seeds for improving soil fertility and pollination, protected cultivation of vegetables, efficient propagation techniques in field and green houses, medium and high density 3-4 year old grafted fruit bearing walnut plantations and a large number of exotic high yielding varieties in apple, almond, apricot, walnut and vegetables etc were the main attractions. Besides field visit, an interaction meeting was also held where various problems pertaining to production of apricot and other fruit crops and post harvest problems were discussed and effective scientific solutions were suggested to the farmers. The farmers were highly impressed and showed very keen interest in adoption of technologies and the new varieties developed at the Institute and have put up large demand for planting material of elite varieties.

Almond Day

An almond Day was observed on 6th August 2009 at Central Institute of Temperate Horticulture, Rangreth, Srinagar. A large number of farmers and a team of Horticulture Officers from different almond growing areas of Jammu and Kashmir participated in this successful event. Madam Sonali Kumar, Principal Secretary, Agriculture Production Department was the Chief Guest Director Horticulture, Kashmir and Director Agriculture, Kashmir were also present on the occasion. The Director Prof. Nazeer Ahmed and Emeritus Scientist- Prof Ab. Ahad Sofi delivered lectures on scientific cultivation of almond and impressed upon the farmers to adopt CITH technologies for enhancing the productivity and farm income. The resource scientists after the inauguration took participants around the farm, museum, nurseries, polyhouses, laboratories etc and demonstrated advance technologies and the exotic varieties identified/developed especially for the high and medium density orcharding of almond and apple. An interaction meeting was also held to know the problems in cultivation of almond and provided effective scientific solutions to mitigate the problems. Farmers were highly impressed with high density orchards and its scientific way of cultivation. On this occasion the bud wood of elite almond varieties was distributed for their popularization.

Organised ICAR's All India Competitive Examination(s)

14th All India Competitive Examination for admissions to U.G. Programmes in Agriculture and Allied subjects on April 19, 2009 and 14th All India Competitive Examination for admissions to P.G. Degree Programmes in Agriculture and Allied subjects and award of JRF on May 16, 2009 were conducted successfully by CITH, Srinagar

ICAR's 14th All India Competitive Examination for admissions to P.G. Degree Programmes

Network Project Launched

Brainstorming session and launching of Network Project on Outreach of technologies on temperate fruits was held on 8th and 9th July 2009. Dr. H. P. Singh, Hon'ble DDG (Hort), was the Chief Guest who addressed the scientists and gave directions how to go ahead in temperate horticulture. He critically reviewed and approved the technical programme of Outreach activities of each centre.

Hindi Week

Hindi week was organized from 14 to 20th September at CITH, Srinagar and RS, Mukteshwar to promote and implement national language Hindi in the Institution. During the week long programme, number of events were conducted like debate; essay writing, poster making etc and prizes were distributed among the winners of different competitions.

ICAR Zonal Sports Meet

Fifteen participants from CITH including Chief De-Mission, Mr Javid Iqbal Mir, Scientist, participated in Zonal Sports Meet which was held at IISR, Lucknow, from 6th to 9th July. 2009. All the participants took part in different games and showed very good discipline and performance. A total of four 4th positions were achieved by the participants in 800m, 1500m, 200m and 100m race. The team was awarded for best discipline and as upcoming team.

IJSC Meeting

Institute Joint Staff Council Meeting was held at CITH, Srinagar on 28th September, 2009. The

action taken report of previous meeting and agenda items of the present meetings were presented before the house and item-wise discussions were held and appropriate action was taken and reported.

RTI meeting

Right To Information meeting was held at CITH, Srinagar on 5th August 2009. Shri Sunjay Gupta (Deputy Secretary Administration) and Shri B. N. Rao (Deputy Secretary GAC) provided training to the CITH staff on different aspects of RTI, financial and record management.

IRC Meeting

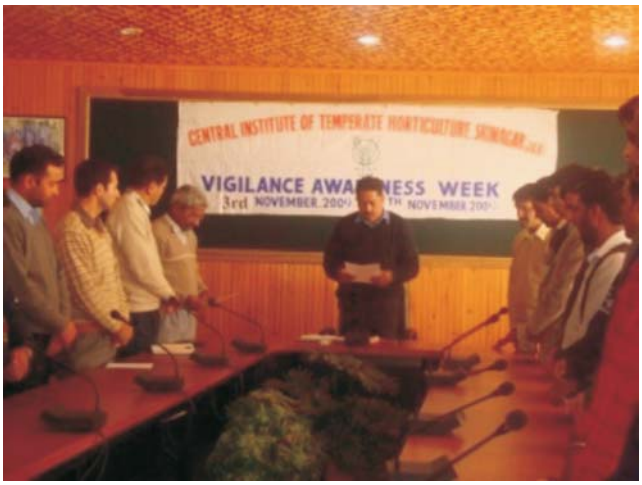
Institute Research Council Meeting was held on 24.09.2010. Project-wise presentations were made by all the scientists. The salient achievements along with the activities to be taken up next year were presented. Prof. Nazeer Ahmed, Director, who is also the Chairman of IRC, gave critical inputs on experimentation for obtaining realistic and reproducible results. New Institute projects were proposed, which were also approved by the house.

7TH Research Advisory Committee Meeting

The 7th RAC meeting was held on 22nd and 23rd October 2009 at main campus, Srinagar under the Chairmanship of Dr D. S. Rathore, Former Vice Chancellor, CSKHPKV, Palampur. The other members of RAC who attended the meeting were Dr. K. K. Jindal,Former-Director of Research, Dr. YSPUHF; Dr. I. D. Tyagi Former-Head, Vegetable Research Station, Kanpur; Dr R. P. Kaushal, Prof. Plant Pathology, CSK HPKV, Palampur, Dr. B.N. Choudhary, Former. ADG (Extension) New Delhi; Prof. Nazeer Ahmed, Director CITH, and Dr. R. K. Verma, Pr. Scientist (PP), and Member Secretary RAC, CITH. The Committee visited the experimental farm and had detailed discussion and interactions with the scientists and suggested recommendations after reviewing all the ongoing projects.

Vigilance awareness week

Vigilance awareness week was observed from 3rd November to 8th November 2009. The vigilance awareness week commenced with the pledge for "continuous striving to bring about integrity and transparency in all spheres of activities"on 3rd November at 11.00AM by all the staff members of CITH.



Extension and Trainings

Training Programme on walnut propagation

Two days training programme on "Techniques of walnut propagation" was organized at Central Institute of Temperate Horticulture (ICAR), Rangreth, Srinagar on 29th and 30th March 2010, under the leadership of Prof. Nazeer Ahmed, Director CITH as Course Director and Dr. S. R. Singh as Course Co-ordinator and Participants came from Katua, Rajouri, Ramban, Doda, Pulwama, Srinagar, Ganderbal, Baramulla, Anantnag and Kupwara districts of J & K. In the training, more emphasis was given on imparting practical knowledge on the latest technologies of low cost propagation from seedling root stock production to different methods of budding and grafting including their after care in the field. At the end certificates and literature were distributed among the trainees.

DUS training and workshop

DUS training on temperate horticultural crops was organized at CITH, Srinagar on 12th August 2009. Detailed procedures of Registration of plant varieties, preparation of guidelines for temperate fruits and nuts and issues related to registration were discussed. Dr. Srivastava, Registrar, from PPV and FRA, Expert scientist Dr, Rajan from CISH and Scientists from SKUAST (K), SKUAST (J) and CITH participated and provided technical input for developing DUS guidelines for temperate fruits and nuts.

Model Training Course

Eight days National level Model Training Course on "Importance of Exotic High Temperate Leafy Vegetables for Export" was organized by CITH from, 6-13th Oct. 2009. Dr. D. B. Singh Pr. Scientist Horticulture was the course Director. Agricultural and horticultural officers from different parts of country participated in the training programme. During the training both practical and theoretical knowledge was imparted to the participants and the latest technologies about production, improvement, protection and post harvest management were demonstrated. Shri. Gulam Hassan Mir, Hon'ble Minister for Agriculture, J & K Govt. was the Chief Guest of valedictory function, who distributed certificates to the trainee participants.

Radio/TV Talks

- Prof. (Dr.) Nazeer Ahmed , Director CITH gave TV programme for Doordarshan-1, Srinagar on 6th Aug. 2009 on "improved varieties and technologies for scientific and advanced cultivation of Almond" during the Almond Day celebrated by CITH, Srinagar.

- Prof. (Dr.) Nazeer Ahmed , Director CITH gave TV programme for Doordarshan-1, Srinagar on 06-04-2009 and 13-10-2009 on "Scientific cultivation of high value exotic vegetables for higher returns."
- Prof. (Dr.) Nazeer Ahmed , Director CITH gave TV programme for Doordarshan-1 on 11th July 2009 on "improved varieties of Apricot released by CITH and technologies for scientific and advanced cultivation of Apricot for maximum returns" during the Apricot Day celebrated by CITH, Srinagar.
- Dr. Dinesh Kumar, Scientist (Horticulture) gave TV programme on 8.7.2009 for Doordarshan-1 Srinagar on "Water Management in Almond",
- Dr. J.K. Ranjan and Dr. Pragya delivered radio talks on AIR, Almora on 06.04.2009 on Vegetable nursery raising and gerbera cultivation in Kumaon hills, respectively.
- Dr B. L. Attri delivered a radio talk on "Mandikaran ke liye phalon aur sabjion ki uchit dibbabandi" on 14.05.2009 through Air Almora.
- Dr Hare Krishna delivered a radio talk on 'Parvatiya ghati kshetron mein aam ki baagwani' at AIR, Almora on 23.06.09.
- Mr. Hilal Ahmed, Research Associate, gave TV programme for Doordarshan -1 on 3.7.2009 on " Newly released Walnut varieties, rapid propagation techniques and their scientific cultivation for profitable returns"
- Sh. Sajad Ahmed, Research Associate gave TV programme for Doordarshan -1 on 3.7.2009 on "Role of Honey Bees in pollination and honey production".
- Dr. D. B. Singh, Pr. Scientist (Horticulture) gave TV programme on 19.1. 2010 for Doordarshan-1 Srinagar on "Post Harvest management of temperate fruits and their processing for value added products".
- Dr. Dinesh Kumar, Scientist (Horticulture) gave TV programme on 19. 1. 2010. for Doordarshan-1 Srinagar on " Achievements of CITH including newly released varieties"

Other Extension Activities

- During the period under report more than 5000 orchardists / farmers from different parts of J&K and Uttarakhand visited the Institute and Regional Station, along with officers from Development Departments. They were taken around the experimental farms and other units and demonstrated various technologies being developed in fruits, vegetables and flowers including propagation and raising of root stocks of walnut, apple, almond and other crops and also provided bud wood and planting material of elite varieties to farmers for popularization.
- Advisory services/Technical advice was rendered to different farmers coming from various regions of state on scientific cultivation of temperate horticultural crops for higher production and farm income.
- Nine demonstration plots have also been laid out in different areas of J&K and Uttarakhand for demonstration of elite varieties, rejuvination and high density orcharding in almond, apple, walnut and apricot for obtaining higher production of quality fruits.
- Farmers and Extension officers were given hands –on training on pruning, training, rain water harvesting, hybrid and quality seed production, propagation techniques, etc.
- For popularization of Kiwi cultivation in Kashmir, demonstrations through participatory research have been laid out at different districts of Kashmir like Uri, Salamabad, Baramulla, Budgam and Pulwama.

List of Publication

A. Research Publications

Ahmed, N. and Singh, D. B. (2009). Status of Temperate Fruits in Cold Arid Regions. Key Note Presentation during "Paper presented during "International Conference on Nurturing Arid Zones for people and environment: Issues and Agenda for the 21st Century, November 24-28, 2009, CAZRI, Jodhpur.

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List of Ongoing Projects

List of approved ongoing Institute projects

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
1.	Survey, collection, characterization and documentation of temperate horticultural crops	CITH-01	1998	On going
2.	Standardization of efficient propagation techniques for production of quality planting material of temperate fruits and nuts	CITH-02	1998	On- going
3.	Standardization of medium, medium high and high density orcharding in temperate fruits and nuts	CITH -03	1999	On going
4.	Large scale multiplication of quality planting material and seeds of temperate horticultural crops	CITH-04	1999	On going
5.	Studies on improvement and production of saffron	CITH – 06	1999	On going
6.	Breeding for development of superior varieties/ hybrids in Solanaceous vegetables	CITH – 07	2000	On going
7.	Collection and varietal evaluation of garlic germplasm under long day conditions	CITH–12	2005	2010
8.	Collection, evaluation and identification of different root crops suitable to temperate region	CITH–13	2006	2009
9.	Standardization of agro techniques for quality cut flower and corm production of gladiolus	CITH–14	2006	2010
10.	Integrated nutrient management in high density apple plantation under different mulching	CITH–15	2007	2010
11.	Bio-efficiency of miticides against apple mites	CITH-16	2007	2009
12.	Maturity indices for apple cultivars in Uttarakhand	CITH-17	2007	2010
13.	Assessment of AM fungi status in apple orchards and its utilization	CITH-18	2007	2010
14.	Standardization of organic agro techniques for peach under high density planting system	CITH-19	2007	2012
15.	Standardization cost effective production technologies for cut flower production in carnation	CITH-20	2007	2010
16.	Management of chilli wilt	CITH-21	2007	2009
17.	Studies on gummosis of stone fruits and its management.	CITH-22	2008	2012
18.	Development of forecasting model for important pests and diseases of temperate fruits & nuts	CITH-23	2008	2012
19.	Evaluation of walnut genotypes in relation to floral biology and yield attributes	CITH-24	2008	2011
20.	Evaluation of promising genotypes of apricot for table and drying purpose	CITH-25	2008	2010
21.	Development of modal for organic baby corn production and its fodder value evaluation	CITH-26	2008	2010
22.	Standardization of pre and post harvest practices for extending shelf life of apple fruits	CITH-27	2008	2010

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
23.	Evaluation of gerbera genotypes under protected conditions and refinement of technologies for production and propagation	CITH-28	2008	2011
24.	Standardization of technique for plug plant production in ornamentals	CITH-29	2008	2012
25.	Minimal processing, packaging and storage study of high value vegetables and fruits for quality maintenance and storage	CITH-30	2008	2012
26.	Energy harvest through plant architectural engineering for increasing source and sink relationship in apple and other temperate fruit crops	CITH-31	2008	2013
27.	Management of physiological disorders in temperate fruits	CITH-32	2008	2012
28.	Management of frost, drought and other abiotic stresses in almond and apple in changing climate scenario	CITH -33	2008	2012
29.	Effect of integrated nitrogen management on yield and quality of almond and soil properties	CITH-34	2008	2012
30.	Performance of exotic vegetables under Kumaon hill conditions	CITH-35	2009	2012
31.	Standardization of off season production technology of pea under NWH conditions of Uttarakhand	CITH-36	2009	2012
32.	Post harvest management of temperate fruits and nuts for storage and value added products	CITH-37	2009	2013
33.	Development of apple based cropping system with legume, spices, vegetables, medicinal and aromatic plants	CITH -38	2009	2012
34.	Evaluation of strawberry varieties under Kashmir conditions in different production systems	CITH-39	2009	2011
35.	Development of superior cultivars/hybrids in temperate fruits through conventional and non conventional methods	CITH-40	2009	2020
36.	Development of intensive cropping system involving almond and saffron	CITH-41	2009	2012
37.	Enhancing blooming period of tulip using PGRs and different storage period	CITH-42	2009	2012
38.	Evaluation and standardization of agro-techniques for quality cut flower production both under poly house and open conditions	CITH-43	2009	2012
39.	Characterization of soil and nutritional survey of temperate fruit crop	CITH-44	2009	2012
40.	Integrated nutrient management in medium and high density orchards in apple	CITH-45	2009	2012
41.	Fertigation studies in almond	CITH-46	2009	2012
42.	DNA finger printing of apple, walnut and apricot	CITH-47	2009	2012
43.	Standardization of micro-propagation of apple, walnut, saffron, lilium	CITH-48	2009	2012
44.	Value addition, storage and sensory quality evaluation of different production from major and minor temperate fruits	CITH-49	2009	2012
45.	Enhancement of shelf life of different temperate fruits through post harvest chemical intervals	CITH-50	2009	2012

Externally Funded Projects

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
1.	Establishment of technology for production of vegetatively propagated superior quality walnut plants	MM- 1.7	2004-05	Ongoing
2.	Production of vegetatively propagated superior quality temperate fruit plants	MM - 1.8	2004-05	Ongoing
3.	Production of quality seeds/seedlings of improved varieties / hybrids of commercially important vegetable crops	MM - 1.9	2004-05	Ongoing
4.	Production of quality planting material of saffron	MM -1.10	2004-05	2010-11
5.	Diversification with off- season high value vegetables for increasing farm income	MM - 1.20	2008-09	2011-12
6.	Diversification in temperate fruit production through introduction of new fruit crops	MM - 1.21	2008-09	2011-12
7.	Standardization of protocol for production of stigma like structures of saffron	MM - 1.22	2008-09	2011-12
8.	In vitro multiplication of virus free clonal rootstocks of cherry	MM - 1.23	2008-09	2011-12
9.	Biological control of white grub	MM - 2.30	2006-07	2010-11
10.	Space and energy harvest under polyhouse through genotype selection, training and pruning	MM - 2.44	2008-09	2011-12
11.	Standardization of technology for rejuvenation of old unproductive almond orchards in Kashmir valley	MM - 2.45	2008-09	2011-12
12.	Production of quality planting material of temperate fruits (Mukteshwar)	MM - HTM	2004-05	Ongoing

DUS Projects

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
1.	DUS on apple and pear	DUS-1	2008-09	2010-11
2.	DUS on walnut and almond	DUS-2	2008-09	2010-11
3.	DUS on apricot and cherry	DUS-3	2008-09	2010-11

Network Projects

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
1.	Net work project on outreach of technologies for temperate fruit crops- CITH Plan Project	plan project	2007-08	On going
2.	AICRP on vegetable crops (ICAR)- Voluntary centre (Srinagar/ Mukteshwar)	C-1	2008	2012
3.	Net work project on outreach of technologies for temperate fruit crops- Srinagar	C-2	2008	On going

S. No.	Title of the Project	Project Code	Duration	
			Date of initiation	Date of complelition
4.	Net work project on outreach of technologies for temperate fruit crops- Mukteswar	C-3	2008	On going
5.	Net work project on onion and garlic (co-operating centre)	C-4	2008	On going
6.	Intellectual property management and transfer/ commercialization of agricultural technology scheme (ICAR)	C-5	2008	On going
7.	Net work project " Assessment of gender issues and identification and refinement of selected women specific technologies in horticultural crops-RS, Mukteshwar(NRCWA, Bhubaneswar as Main centre)	C-6	2009	On going
8.	Survey, collection, evaluation and conser-vation of temperate pomegranate genotypes/ wild species/ varieties under North Western Himalayan region	Inter Institutional Project	2010	On going

Research, Review and Management Committees

Research Advisory Committee Members

1.	Dr. D.S. Rathore Ex. Vice Chancellor, CSKHPKV, j 1/63 Khirki Extension , Kalvia Nagar New Delhi-110017	Chairman
2.	Dr. K.K. Jindal Ex. Director of Research UHF, Jindal Niwas, Surya Vihar, Rajgarh Road, Solan -1733 212	Member
3.	Dr. I.D. Tyagi Ex. Head Vegetable Research Station Kalayanpur (Kanpur) R/O Flat No. 206, Vasundhara, Valley Apartment, Sector-6 Gaziabad-202 012	Member
4.	Dr. R.P. Kaushal Professor Department of Plant Pathology, CSK Himachal Pradesh Agril. University, Palampur-176062 (HP)	Member
5.	Prof. M.A. Masoodi, Registrar Islamic University Post Box No. 120 GPO, Srinagar -190001	Member
6.	Dr. B. N. Choudhary, 154 Keshav Kunj, Plot No. 15 A, Sector -22, Dwarka, New Delhi 110075	Member
7.	Dr S. Rajan Asstt. Director General (Hort. I) ICAR, KAB-II, Pusa New Delhi 110012	Member
8.	Shri Thakur Randhir Singh Former Minister (J &K), 298 EP Flat, Wazarat Nagar, Jammu – Tawi	Member
9.	Shri Abdul Aziz Bazaz Progressive orchardist, Gojwara, Shishbagh, Srinagar	Member
10.	Prof. Nazeer Ahmed Director CITH, Srinagar	Member
11.	Dr. R.K. Verma Principal Scientist, CITH, Srinagar	Member Secretary

Institute Management Committee (IMC)

S. No.	Name of Officer with Designation and address	Designation
1.	Prof. Nazeer Ahmed, Director, CITH, Srinagar	Chairman
2.	Dr S. Rajan Asstt. Director General (Hort. I) ICAR, KAB-II, Pusa, New Delhi	Member
3.	Director (Horticulture) Govt. of J&K, Rajbagh, Srinagar (J&K)	Member
4.	Director (Horticulture & Food Processing) Department of Horticulture, Chabuthai Ranikhet, Almora (Uttarakhand)	Member
5.	Dr. M. S. Wani Prof. cum Chief Scientist Fruit Breeding, Division of Pomology, SKUAST-K, Srinagar	Member
6.	Shri Thakur Randhir Singh Former Minister, 298 EP Flat, Wazarat Nagar, Jammu -Tawi	Member
7.	Shri Ab. Aziz Bazaz Progress Orchardist, Gojwara, Shishbagh, Sriangar - 190002	Member
8.	Finance and Accounts Officer, CPRI, Shimla (HP)	Member
9.	Dr. A.K. Singh Head, Fruit and Horticulture Technology IARI, New Delhi - 110012	Member
10.	Dr. A.T. Sadashiva, Principal Scientist (VC), IIHR, Bangalore	Member
11.	Dr. M.K. Verma, Senior Scientist (H), CITH, Srinagar (J&K)	Member
12.	Shri. Javid Iqbal Mir, Scientist (H), CITH, Srinagar	Member
13.	Shri Y.S. Dhanik, Asstt. Admn. Officer, CITH, Srinagar	Member Secretary

Second Quinquenniel Review Team

To review the work done from 01-04-2003 to 30-09-2009 and to suggest road map for future development and research work, the Director General, ICAR, constituted the following Quinquennial Review Team (QRT) for CITH with terms of reference vide office order No. F. NO. 1-1/2008-IAV dt. April 27, 2008. The QRT after thourough review and discussions submitted its report to council and the recommendations of QRT were also got approved by the Governing Body of the council.

1.	Dr. Jagmohan Singh, Ex-Vice-Chancellor, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan (H.P)	Chairman
2.	Dr. Kuku Wazir, Ex. Director Horticulture (J &K) Rajbagh Srinagar (J & K)	Member
3.	Dr. M.C. Nautiyal Dean, GBPUA&T, Hill campus, Ranichauri, Tehri-Garhwal (Uttarakhand)	Member
4.	Dr. R.D. Rawal, Ex-Principal Scientist, IIHR, Bangalore	Member
5.	Dr. D.S. Khurdiya Ex.-Head, Post Harvest Technology, IARI, SFS-149, Pkt. 10, Sector, XI (Extension),Rohini, New Delhi -110 085	Member
6.	Dr. M.A. Khan, Professor & HeadDepartment of Entomology, GBPUA&T, Pantnagar -263 145 (Uttarakhand)	Member
7.	Dr. R. K. Verma, Pr. Scientist, CITH, Srinagar	Member Secretary

Meetings/Visits of Prof. Nazeer Ahmed Director, CITH

- Brainstorming on Management of Horticultural Crop Genetic Resources, NBPGR, New Delhi, 21st April 2009
- Steering Review Committee Meeting of HTM MM –I, NASC Complex, New Delhi 23rd April 2009.
- Delivered invited lecture in one day workshop on Rainfed Horticulture Directorate of Horticulture, Jammu on 8th June 2009.
- Attended workshop on DUS testing of temperate fruit crops, NASC Complex, New Delhi/CPRI Shimla, 1st July 2009.
- ICAR Foundation Day Celebration and Brain Storming on Conservation Agriculture, NASC, Complex New Delhi, 16-18th July 2009.
- Workshop on IT Application in Horticultural Crops, CPRI, Shimla, 23-24th August 2009.
- Attended final meeting of 2nd QRT (CITH) and Apple Project presentation at DBT, New Delhi, 4-6th Nov. 2009.
- HTM Meeting with PI's of MM-I (Research), SKUAST-J, and Directorate of Horticulture, Jammu, 3-5th Dec. 2009.
- Review Meeting of Horticulture Division Directors with Hon'ble Director General, ICAR, KB, New Delhi, 14th-18th Feb. 2010.
- Review meeting of HTM projects of SKUAST-J, Jammu, 24th Feb.2010.
- National Conference on Production of Quality seeds and Planting Material- Health Management in Horticultural crops, NASC, New Delhi, 9-14th March 2010.
- National Symposium on conservation Horticulture, GBPUAT Pantnagar/ Dehradun, 21-24th March 2010

Workshops/ Seminars/ Symposiums Attended by Scientists and staff

- Dr Dinesh Kumar, Principal Scientist, Fruit Crops attended summer school on photosynthetic efficiency and crop productivity under climate change scenario from 25th Aug. to 14th September, 2009 at IARI, New Delhi
- Dr S. R. Singh, Senior Scientist, Vegetable Science, attended Interactive meeting of AINRP on onion and garlic on 26.04.2009 at DOOG, Rajgurunagar, Pune
- Dr D. B. Singh, Pr Scientist, Horticulture, attended training programme on "Quality assurance and shelf life enhancement of fruits and vegetables through novel packaging technologies" from Sept 25 to Oct.15 2009
- Y. S. Dhanik AAO attended the training on "Handling of CAT cases and court cases" from 29-31 July 2009 at ISTM, New Delhi
- Dr Biswajit Das, Senior Scientist, Horticulture attended Steering Committee Meeting of Mini-Mission-I on 23.06.09 at VPKAS, Almora
- Dr. Harshwardhan Choudhary, Scientist vegetable science attended winter school on "Advances in commercial Agriculture" from March 18, 2009 to April 07 at G.B. Pant University of Agriculture and Technology , Pantnagar
- Dr. H. Choudhary, Scientist, VS attended winter school on "Recent advances in Biological control of plant disease" from 20 March to April 09 at G.B. Pant University of Agriculture and Technology , Pantnagar
- Dr. Dinesh Kumar,Pr. Scientist, CITH, Srinagar attended International Conference on Food Security and Environmental Sustainability from 17 to 19th December, 2009 at AFED and IIT, Khargpur.
- Dr. M. P. Sharma, Pr. Scientist attended training on Challenges of Food Security and Environmental Quality from 22-25th December, 2009 at IARI, New Delhi
- Dr. S. R. Singh, Sr. Scientist, attended training on Marker assisted breeding in vegetable crop from 01-12-09 to 21-12-09 at IIVR, Varanasi(U.P)
- Dr. S. R. Singh, Sr. Scientist attended XXVIII Group Meeting of AICRP on Vegetable Crops at Bangalore
- Dr. K. K. Srivastava, Sr. Scientist, CITH, Srinagar attended training on Current Regulations and policies for Access to Genetic Resources from 10-19th, Nov. 2009 at NBPGR, Pusa Campus, New Delhi
- Dr. B. Das, Sr. Scientist attended workshop on Horticultural Technology Mini-Mission at VPKAS, Almora on 12.10.09 and 17.03.10.
- Dr. J. K. Ranjan, Scientist attended Brain storming session on different inspects of post harvest management technology from 24-11-09 to 25-11-09 at IIVR, Varanasi, (U.P)
- Sh. Javid Iqbal Mir, Scientist, CITH, Srinagar attended Winter School on 'Bio-information and Statistical Genomics' from 17th Nov. to 7th December, 2009 at IASRI, Library Avenue, New Delhi
- Sh. Shivlal, Scientist, CITH, Srinagar attended International training programme on *In-Vitro* and cry preservation techniques for conservation of plant genetic resources from 17th Nov. to 7th December, 2009 at NBPGR, New Delhi
- Shri. Y. S. Dhanik, AAO attended training programme on New Pension Scheme on 11th December 2009 at IASRI, New Delhi
- Shri. F. A. Dar, AF&AO, attended training programme on New Pension Scheme on 11th December 2009 at IASRI, New Delhi
- Shri Diwan Chandra, Sr. Clerk, attended

training programme on New Pension Scheme on 11th December 2009 at IASRI, New Delhi

- Shri. Mukhtar Ah., Sr. Clerk attended training programme on New Pension Scheme on 11th December 2009 at IASRI, New Delhi
- Dinesh Kumar Pr.Scientist CITH, Srinagar attended National Symposium on climate change and rain fed agriculture, February 18-20,2010 at CRIDA, Hyderabad
- Dr. Dinesh Kumar, Pr. Scientist, CITH Srinagar attended National Conference on Production on Quality Seeds and Planting Material Health Management in Horticulture Crops from 11-14, March, 2010 at IARI, New Delhi
- Dinesh Kumar Pr.Scientist attended workshop on ground water quality in J & K State organized by Central Ground Water Board, Jammu and Kashmir, March 25,2010.
- Dr. B. L. Attri, Pr. Scientist, CITH, RS, Mukteswar attended National Symposium on Conservation Horticultural from 21-23, March, 2010 at Dehradun
- Dr. Biswajit Das, Sr. Scientist attended National Conference on Production on Quality Seeds and Planting Material Health Management in Horticulture Crops from 11-14, March, 2010 at IARI, New Delhi
- DR. J.K. Ranjan attended "XXVIII AICRP Meeting of All India Co-ordinated Research Project (Vegetable Crops)" from Jan 17-19, 2010 at IIHR, Bangalore.
- Dr. Pragya, Scientist, CITH, RS, Mukteshwar attended National Symposium on Lifestyle Floriculture Challenges and opportumtis on 15-02-2010 at Dr. YSPUHF, Solan
- Sh. Javid Iqbal Mir, Scientist attended workshop on ICAR Zonal Technology Management and Business Planning and Development-meeting cum workshop from 19-20th March, 2010 at IARI, New Delhi
- Sh. Shiv Lal, Scientist attended National Conference on Production on Quality Seeds and Planting Material Health Management in Horticulture Crops from 11-14, March, 2010 at IARI, New Delhi
- Shri. Y.S. Dhanik, AAO, CITH, Srinagar attended Orientation course in Record Management 2009-2010 from 09- 13 Feb. 2010 at New Delhi
- Shri. Ramesh Kumar, Scientist, attended winter school on Architectural Engineering of Vegetable Crops and their Management from 02 to 22 February, 2010 at, Punjab Agricultural University, Ludhiana.
- Shri Eshan Ahad, T-5 attended National Workshop for the sensitization of the ARIS in-charge about the uniformity guidelines for websites on 19, March, 2010 at NBPGR, New Delhi

Appointments/New Joinings

1.	**Dr. M. P. Sharma,** Joined CITH, Srinagar as Principal Scientist, Soil Science w.e.f. 7th August 2009. He was earlier serving as Professor cum Chief Scien tist at SKUAST (J), Jammu.	
2.	**Shri Ramesh Kumar,** joined as Scientist, Floriculture at CITH, Srinagar w.e.f. 20th June, 2009 after completing foundation training at NAARM, Hyderabad.	
3.	**Dr G. Mahendirin** Joined as Scientist, Ag. Entmology, at CITH, Srinagar on 15.03.2010 after success fully completing his FOCARS training at NAARM, Hyderabad.	

Transfer (s)

•	Dr. Harshvardhan Choudhary, Scientist, Vegetable Science relieved from this Institute on 25th June, 2009 to join as Scientist, Vegetable Science at IARI, New Delhi.
•	Dr. M. K. Verma, Senior Scientist, Fruit Science relieved from this Institute on 1st August, 2009 to join as Senior Scientist, Fruit Science at IARI, New Delhi.
•	Dr V. K. Sharma, Senior Scientist, Soil Science relieved from this Institute on 30.10.2009 to join as Senior Scientist, Soil Science at IARI, New Delhi.
•	Mr. Sunil Kumar Rewar, T-1 was relieved on 6th February 2010 for joining his new assignment as Horticulture Officer, at National Horticulture Board, Gurgaon.

Distinguished Visitors

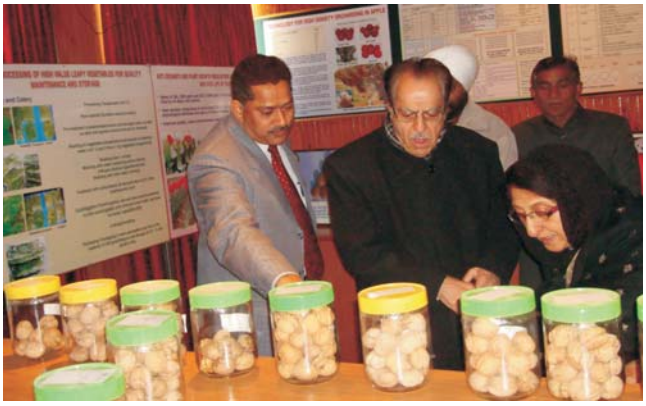
- Hon'ble DDG (AS), Dr. K. M. Bujarbaruah visited CITH, Regional Station, Mukteshwar on 21.06.09
- Dr. B. Patnaik, Director, PDFMD, visited CITH, Regional Station, Mukteshwar on 21.06.09.

Hon'ble DDG, Dr. H. P. Singh interacting with Director, Scientists and other staff of CITH

- Director, CIMAP, Lucknow visited CITH, Regional Station, Mukteshwar on 21.06.09.
- Dr M.A. Khan, Director, ICAR Research complex for Eastern Region Patna, visited CITH, Srinagar on 26.06.09

Shri. Sham Lal Sharma, Hon'ble Minister for Horticulture (J&K) during field visit at CITH

- Prof M.M. Anwar, Director NRC on Seed spices, Ajmer, Rajasthan, visited CITH, Srinagar on 26.06.09
- Dr. K.A. Singh Director IGFRI Jhansi, visited CITH, Srinagar on 27.06.09
- Dr S. D. Rai, Ex. ADG (TC) Chairman QRT, IGFRI visited CITH, Srinagar on 27.06.09
- Hon'ble DDG (Hort.), ICAR, Dr. H. P. Singh, visited CITH, Srinagar on 08-07-2009
- Dr. B. Mishra Vice chancellor SKUAST-J visited CITH, Srinagar on 10.07.09
- Sh. Chet Singh, Ex-Secretary, Uttarakhand along with foreign delegates visited CITH, Regional Station, Mukteshwar on 14.0709.
- Dr. N.K. Tyagi Member ASRB, visited CITH, Srinagar on 24.07.09
- M. M. Pandey, Hon'ble DDG (Agri. Engineering), ICAR, KAB-II, New Delhi visited CITH, Srinagar on 21.08.09



Prof. Saifuddin Soz appreciating elite walnut selections at CITH

- Shri. Sham Lal Sharma, Hon'ble Minister for Horticulture, Floriculture and Health visited CITH, Srinagar on September, 2009.
- Jenab Ghulam Hassan Mir, Hon'ble Minister for Agriculture visited CITH, Srinagar on 13th October, 2009.
- Professor Saifuddin Soz, Former Minister for Forests and Environment, Govt. of India, visited CITH, Srinagar on 20th February 2010

Awards & Recognitions

- National Horticulture Board, Govt. of India, Gurgoan, evaluated CITH nursery and awarded four star for its quality planting material production in temperate fruits.
- Dr. D.B. Singh, Pr. Scientist was awarded Certificate of Appreciation from Director CIPHET, Ludhiana, for being associated in development of innovative technologies titled (a) CIPHET Pomegranate Aril Extractor (b) Hand tool for easy separation of arils from pomegranate, released on September 07, 2009 to M/S Padmatech Engineering Systems, Pune – 411026, Maharastra.
- Dr. D. B. Singh, Pr. Scientist was awarded Bioved Fellowship Award 2010 conferred by Bioved Research Society, on the occasion of 12th Indian Agricultural Scientists and Farmers Congress on 20-21 February held at Allahabad, U.P.
- Dr. B.L. Attri was received the 'Best Poster" award at National Symposium on Conservation Horticulture, 21-23 March, 2010.
- Dr B. Das participated in Hindi Week-2009 and won second prize in Samanya Gyan, Vaad-Vivad and Kisi Vishay par Do Minute Bolna.
- Mr. Javid Iqbal Mir, Scientist Biotechnology was recognized as "Outstanding Participant" in the ICAR Winter School on "Bioinformatics and Statistical Genomics" organized at Indian Agricultural Statistics Research Institute, New Delhi from 17th November to 7th December 2009
- Mr. Shiv Lal, Scientist, Fruit Science got Best Research Paper award confirmed by HSI, New Delhi on the occasion of its Foundation Day on 26.12.2009.

Mr Shiv Lal receiving best paper award by Dr. K.L. Chadha, president, HSI, New Delhi

- Dr. D. B. Singh, Principle Scientist got Best Paper Award entitled "Development of tool and machine for safe saperation of Arils from Pomegranate" Paper presented during 2nd International Symposium on Pomegranate and Minor Including Mediterrranean Fruits (ISPMMF) June 23-27 2009 held at UAS, Dharward, India.

Expert team from NHB evaluating horticulture nursery of CITH, Srinagar

Personnel

CITH HEAD QUARTER, SRINAGAR

RMP

- Prof. Nazeer Ahmed, Director

Scientific

- Dr. R. K. Verma, Principal Scientist, Plant Pathology
- Dr. D.B. Singh, Pr. Scientist, Hort. Vegetable Science
- Dr. Dinesh Kumar, Pr. Scientist, Hort. Fruit Science
- Dr. M.P.Sharma, Pr. Scientist, Soil Science
- Dr. S.R. Singh, Sr. Scientsit, Hort., Vegetable Science
- Dr. K. K. Srivastava, Sr. Scientsit, Hort., Fruit Science
- Mr. J.I. Mir, Scientist, Plant Biotechnology
- Mr. Shiv Lal, Scientist, Hort., Fruit Science
- Mr. Ramesh Kumar, Scientist, Floriculture
- Dr. G. Mahendirin, Scientist, Agricultural Entomology

Director Cell

- Sh. G.A. Sofi, P.S. To Director

Technical

- Sh. Eshan Ahad, T-5
- Sh. Brijendra Kumar, T-5
- Sh. Muneer Ahmad Sheikh, T-3
- Sh. Diwakar Vithuji Sawaji, T-2
- Sh. Mehraj-ud-din Bhat T-2 (Driver)
- Sh Farman Ali, T-2 (Driver)
- Sh. Sunil Kr., T 1

Administrative

- Sh. Y. S. Dhanik, Asstt. Admn.Officer
- Sh. Fayaz Ahmad Dar, AF & AO
- Sh. Ramesh, Assisstant.
- Ms. Shahida Rafiq, Jr. Stenographer
- Sh. Showkat Ahmad Mir, UDC
- Sh. Mukhtar Ahmad, UDC
- Sh. Reyaz Ahmad Mir, UDC (on deputation)
- Shri Mehraj-ud Din Meer, LDC

SUPPORTING STAFF

- Sh. Ajaz Ahmad Wani, S.S.Gr.-II
- Sh. Bashir Ahmad Dar, S.S.Gr.-II
- Sh. Abdul Rashid Bhat, S.S.Gr.II
- Sh. Showkat Ahmad Dar, S.S.Gr.II
- Sh. Bashir Ahmad Ganai, S.S.Gr.-II
- Sh. Madan Lal, SSGr.II
- Sh. Ishtiyaq Ahmad Sheikh, SSGr I
- Sh. Zubair Ahmad Swathi, S.S.Gr.I

CITH (RS), Mukteshwar

Scientific

- Dr. B.L. Attri, Pr. Scientist, Hort. Fruit Science
- Dr. Biswajit Das, Sr. Scientist, Hort. Fruit Science
- Dr. J. K. Ranjan, Scientist, Hort. Vegetable Science
- Dr. Pragya, Scientist, Hort. Floriculture
- Dr. Hare Krishna, Scientist, Hort. Fruit Science

Technical

- Sh Vinod Chandra, T-5
- Sh Man Mohan Singh, T-3 (Driver)
- Sh Chuni Lal, T-1
- Sh Puran Chandra, T-1

Supporting

- Sh. Laxman Singh, SS Gr. IV.
- Sh. Narayan Singh, SS Gr I.
- Sh. Govind Giri, SS Gr I.

Administrative

- Sh. Diwan Chandra, UDC.
- Sh Shoba Ram, LDC (Upto 5th August, 2009)