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A REVIEW ON COTTON NEW CULTIVARS PERFORMANCE ASSESSMENT FOR INTRODUCTION AND COMMERCIALIZATION IN IRAN

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Abstract

Improved cultivars of crops are the most important factor in optimizing yield and quality of the products. Cotton is one of the most important industrial crops and enhancement of seed cotton yield, fiber quality as well earliness are among the objectives of new cotton cultivars development. Despite of the improvement and introduction of new cotton cultivars in Iran in recent years, new introduced cotton cultivars have also been registered, introduced and commercialized in the country. Therefore, the cultivation of new introduced cotton cultivars that are early maturity, high-yielding with good fiber quality has been included in the cotton production plan of the Ministry of Jihad-e-Agriculture of Iran. Cotton varieties improvement and release backed to 1960s and now 42 Iranian and foreign improved cotton varieties entitled in Iran's National Plants Varieties List and annually some Iranian and foreign improved cotton varieties introduced and released by Value of Cultivation and Use (VCU) trials conduction by Iranian plants varieties registration national focal point, Seed and plant Certification and registration Institute (SPCRII). The paper presented a review on cotton new cultivars performance assessment for introduction and commercialization in Iran.

Key words: Tetraploid cotton varieties, DUS and VCU trials, Variety assessment.

Introduction

Cotton is one of the most important industrial crops in Iran (Hamidi *et al.*, 2012). During 2021-2022 crop year cotton

fields harvested area was 118473 hectares, produced seed cotton amount was 374444 tons and 3198 and 1785 kg/ha respectively irrigated and rain fed seed cotton yield in Iran (Jihade-e- Agriculture Ministry, 2024).

Plant varieties are the most important achievements of plant breeding. Improved cultivars of crops varieties are the most important factor in optimizing yield and quality of the products. Farmers access to crops new improved cultivars for optimum quantity and quality crop production is very important. Plants improvement science is the art of improved ideal characteristics for human demands for food and livestock feeding and industrial products like as natural fibers provide. Crops varieties improvement history in Iran backed to 1940s and some important main crops like as wheat, barley and cotton improvement in Iran began in seed and Plant Improvement Institute (Sadeghian Motahar, 2008).

The first cotton improved variety that name was Arya and was a diploid variety (*G. herbaceum*) improved from a local genotype and released during 1940s and certified seeds produced. Then the first tetraploid upland cotton variety, Varamin was released in 1967. The Varamin variety is a high seed cotton yielding variety bus is very late maturity variety. Because of the Varamin cotton variety was sensitive to *Verticillium* wilt and therefore the Varamin cotton variety fields damaged by *Verticillium* wilt in contaminated soils to the *Verticillium dahlia* fungi regions in Iran, the second improved tetraploid upland cotton variety, Sahel which is a *Verticillium* wilt tolerant variety improved and derived from the Varamin cotton variety and ha the best fiber quality was released in 1969 but Sahel variety was a relatively low seed cotton yield and very late maturity variety which now is an obsolete variety. Two others the main cultivated commercial improved tetraploid upland cotton varieties

were Bakhtegan and Mehr, released in 1987 and 1995 respectively. Bakhtegan was a good fiber quality and high seed cotton yielding *Verticillium* wilt tolerant variety improved for cultivation in Fars province of Iran and relatively late maturity variety and because cotton cultivated in Fars province as a second crop of cultivation after autumn wheat and barley fields, so becomes very late maturity variety and now is an obsolete variety. Also, Mehr variety was a relatively early maturity variety which suitable for cultivation in Moghan plain region of Ardabil province in the Norths of Iran (Alishah, 2013).

Until 2003 Iran lacking any seed law and the Act of Plant Varieties Registration, Control and Certification of Seeds and Plant Materials of Islamic Republic of Iran Act was in approved in parliament in 2003 and according to this Act and for the purpose of safeguarding national interests and organizing the process of controlling and certifying seeds and plant materials and for protection of breeders' intellectual properties, the Ministry of Jihad-e-Agriculture shall be responsible to identify and register the newly produced plant varieties and take actions to control and monitor the affairs related to the country's seed and plant material (Mozafari *et al.*, 2010).

Also according to the Act second article, for the implementation of the provisions of this Act, the Seed and Plant Certification and Registration Institute, SPCR II (Figure 1), established within the Agricultural Research Extension and Education Organization (AREEO) in the Ministry of Jihad-e-Agriculture. The institute exclusively carry out all nations

wide activities related to the identification and registration of plant varieties and control and certification of seeds and plant materials. The Act third article explained, in case the new plant varieties fully comply with the following conditions and requirements are eligible to be registered: 1) The new cultivars should have distinct genetic characteristics and features as compared to previously registered or identified cultivars. The transgenic

varieties shall be subject to the provisions of this Clause, 2) New varieties shall be identical from genetic, and morphological aspects or both, and 3) specification of the variety, whether a hybrid or non-hybrid one shall remain unchanged during the years of production and propagation (Seed and Plant Certification and Registration Institute, 2019).



Figure 1- Seed and Plant Certification and Registration Institute (SPCRII) headquarter at Karaj, Iran.

Therefore as developed countries and based on the Act of Plant Varieties Registration, Control and Certification of Seeds and Plant Materials in Iran, registering a new plant variety for marketing requires it to the variety name be entitled on the Iran's National Plants Varieties List. The list includes varieties that have been evaluated, registered and approved in Iran National Plants Varieties Board. So the Seed and Plant Certification and Registration Institute (SPCRII) is responsible for managing the new plants varieties list and overseeing the registration process. Therefore the Seed and Plant Certification and Registration Institute

(SPCRII) plays a crucial role in this process, ensuring the protection of national interests and breeders' rights (Mozafari *et al.*, 2010).

The plants new varieties registration and introduction process in Iran conduction based on UPOV guidelines for Distinctness, Uniformity, and Stability (DUS) trial and therefore involves demonstrating that the variety meets specific CRII criteria, by conduction Distinctness, Uniformity, and Stability (DUS) trial for improved in Iran varieties or taking issued valid Distinctness, Uniformity, and Stability (DUS) trial

results report by national focal point of new plants varieties registration in other countries for foreign varieties. Distinctness, Uniformity, and Stability (DUS) concept is the new plant variety must be distinguishable from existing varieties, exhibit uniformity in its characteristics, and maintain those characteristics across generations (Seed and Plant Certification and Registration Institute, 2019).

Also for field cultivated main crops like cotton in addition its Value of Cultivation and Use (VCU) must be evaluated by related trial conduction. By Value for Cultivation and Use (VCU) trial, the variety must be tested for its suitability for cultivation and use, ensuring its practical value (Figure 2).

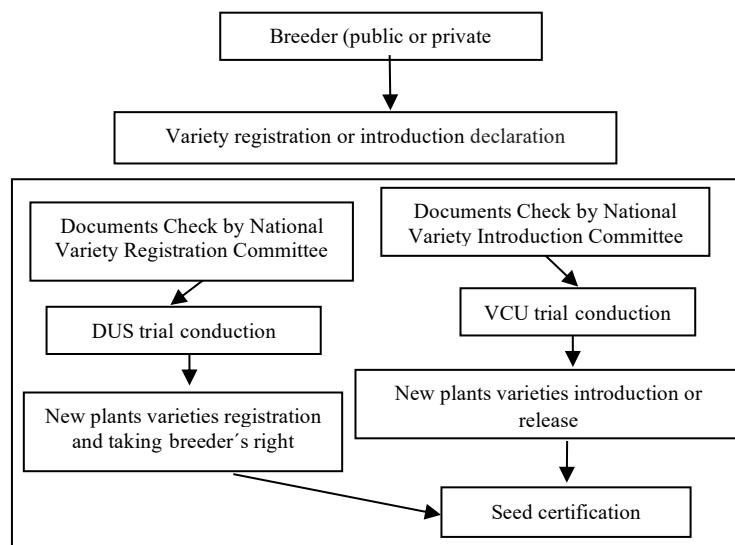


Figure 2- New plants varieties registration and introduction process for commercialization and taking breeder's right in Seed and Plant Certification and Registration Institute (SPCRII) diagram (Mozafari *et al.*, 2010).

Cotton varieties Value of Cultivation and Use (VCU) trial national guideline prepared for first time in Iran in 2009 (Figure 3) and then the first Value for Cultivation and Use (VCU) trial conducted during 2012 to 2015 and the project report, Evaluation and determination of some new cotton (*Gossypium hirsutum* L.) cultivars Value for Cultivation and Use (VCU) published in 2016 and some Iranian improved tetraploid upland cotton new varieties improved by Cotton Research

Institute of Iran (CRIII) including, Khordad, Sepid, Golestan, Armaghan, Latif, Sjadi, Hekmat, Shayan, Taban, Parto, Kashmar and Khorshid varieties released (Hamidi, 2016).

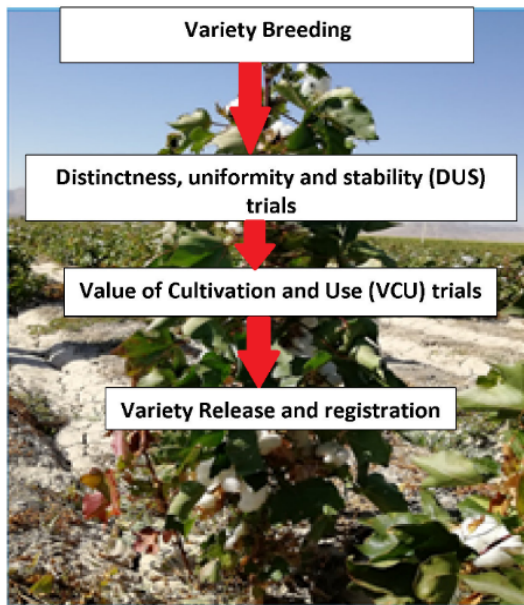


Figure 3- Variety breeding and release process stages in Iran diagram (Hamidi *et al.*, 2025).

Until 2007 which three new commercial improved tetraploid upland cotton varieties, Khordad, Sepid and Armaghan varieties released, annually more than 5000 tons certified seeds of four mentioned commercial improved tetraploid upland cotton varieties produced in Iran. Khordad is early maturity and high seed cotton yielding and good fiber quality, also Sepid is an okra leaf form cotton variety with the best fiber quality among Iranian improved tetraploid upland varieties and relatively early maturity and high seed cotton yielding variety and Armaghan variety is a high seed cotton yielding and good fiber quality relatively early maturity variety which tolerant to salinity and drought stresses. Then, another the main cultivated commercial improved tetraploid upland cotton variety, Golestan, was

released in 2009. Golestan is an early maturity, high yielding having good fiber quality and *Verticillium* wilt tolerant variety suitable for cultivation in Golestan and Fars provinces those cotton cultivated areas soils usually contaminated with *Verticillium dahlia* fungi which now the most cultivated cotton variety in Iran. Latif and Shayan commercial improved tetraploid upland cotton varieties released in 2014 and 2015 respectively. Latif is a high seed cotton yielding, good fiber quality and *Verticillium* wilt tolerant variety suitable for cultivation in Golestan and Mazandaran provinces. Also, Kashmar, Khorshid and Sajedi three other main cultivated commercial improved tetraploid upland cotton varieties released in 2016. All, three cotton varieties close canopy varieties which suitable for narrow planting rows cultivation for high density planting especially Kashmar and Khorshid varieties are very closed canopy varieties which suitable for ultra-narrow row cultivation for very high plant densities (Figure 1). Also Hekmat, a close canopy high seed cotton yielding and good fiber quality variety, and two improved via mutation by radiation Parto and Taban, main cultivated commercial improved tetraploid upland cotton high seed cotton yielding and good fiber quality varieties, were released in 2018. Fakhr and Jahesh are the newest commercial improved tetraploid upland cotton varieties which improved via mutation by radiation and released in 2023.



Figure 4. Kashmar cotton variety closed canopy form variety plant (right) and the field performance of Kashmar cotton variety in Razavi Khorasan province Kashmar city agriculture research station (Ramezani Moghaddam, 2014a).



Figure 5. Khorshid cotton variety closed canopy form variety plant (right) and the field performance of Kashmar cotton variety in Razavi Khorasan province Kashmar city agriculture research station (Ramezani Moghaddam, 2014b).

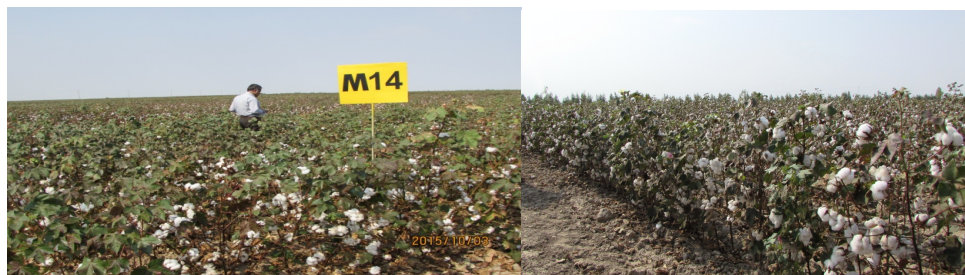


Figure 6. Parto (right) and Taban (Left) mutant cotton varieties field performance in Golestan province, Anbar Oloom region (Alishah, 2018).



Figure 7. Hekmat cotton variety closed canopy form variety plant (right) and the field performance of Hekmat cotton variety in Fars province Darab city agriculture research station (Hekmat *et al.*, 2020).

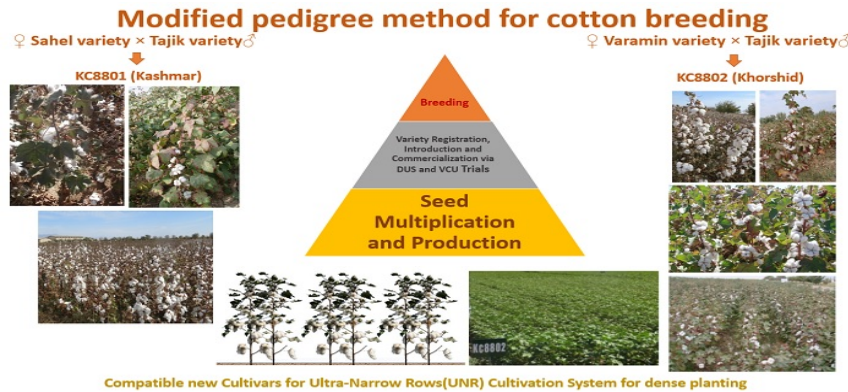


Figure 8- Kashmar and Khorshid varieties improvement, registration and seed multiplication scheme (Hamidi *et al.*, 2022b).

Tetraploid upland cotton is an exotic crop plant in Iran and therefore all improved tetraploid upland cotton varieties origin are foreign cotton varieties and genotypes and comes from selection and hybridization of pure lines by improvement projects by Iran Cotton Research Institute (CRII). Until 2016 all commercial improved tetraploid upland cotton varieties comes from Iran Cotton Research Institute (CRII) improvement. So, because of importance of early maturity high seed yielding and good fiber quality and suitable for mechanically harvest of seed cotton varieties introduction in development of cotton cultivation in Iran the first foreign tetraploid upland cotton varieties including

6 Turkish varieties planted in Iran during 2015 and 2016 and they registered and released in 2018.

Now Iran's National List of Plant Cotton Varieties (Table 1) including 41 registered improved tetraploid upland cotton varieties and one local diploid local cotton variety, totally 42 registered cotton varieties. Also, 41 registered improved tetraploid upland cotton varieties including 19 Iranian varieties improved by Iran Cotton Research Institute (CRII) and 22 foreign cotton varieties all originated from Turkey and Greece countries (spCRII.ir).

Table 1- Iran's National List of Plant Cotton Varieties (spCRII.ir)

No.	Variety Name	Variety Code	Release Year	Title Holder	Breeder or Breeders Name	Protection
1	Varamin	1.3.2.1	1967	Cotton Research Institute(CRII)	Mr. Ghasem Bashari	-
2	Sahel	1.3.2.2	1969	Cotton Research Institute(CRII)	Mr. Hamid Moshir Abadi	-
3	Bakhtegan	1.3.2.3	1985	Cotton Research Institute(CRII)	Mrs. Zohre Hosseinienejad	-
4	Mehr	1.3.2.4	1995	Cotton Research Institute(CRII)	Mr. Dr. Nabio Allah Nemati	-
5	Armaghan	1.3.2.5	1995	Cotton Research Institute(CRII)	Mr. Ali Asghar Miri and Mr. Dr. Omran Alishah	-

No.	Variety Name	Variety Code	Release Year	Title Holder	Breeder or Breeders Name	Protection
6	Sepid	1.3.2.6	1997	Cotton Research Institute(CRII)	Mr. Dr. Omran Alishah <i>et al.</i>	-
7	Khordad	1.3.2.7	1997	Cotton Research Institute(CRII)	Mr. Dr. Mohammadreza Ramazani Moghaddam	-
8	Golestan	1.3.2.8	1999	Cotton Research Institute(CRII)	Mr. Ali Asghar Misi and Mr. Dr. Omran Alishah	-
9	Ltif	1.3.2.9	2014	Cotton Research Institute(CRII)	----	Protected
10	Shayan	1.3.2.10	2015	Cotton Research Institute(CRII)	----	Protected
11	Kashmar	1.3.2.11	2016	Cotton Research Institute(CRII)	Mr. Dr. Mohammadreza Ramazani Moghaddam	Protected
12	Khorshid	1.3.2.12	2016	Cotton Research Institute(CRII)	Mr. Dr. Mohammadreza Ramazani Moghaddam	Protected
13	Sajedi	1.3.2.13	2016	Cotton Research Institute(CRII)	Mr. Dr. Mohammadreza Zangi	Protected
14	Hekmat	1.3.2.14	2018	Cotton Research Institute(CRII)	Cotton Research Institute(CRII)	Protected
15	BA440	1.3.2.15	2018	Progen Tohum Co.	Progen Tohum Co.	Protected
16	PG2018	1.3.2.16	2018	Progen Tohum Co.	Progen Tohum Co.	-
17	Flash	1.3.2.17	2018	Progen Tohum Co.	Progen Tohum Co.	-
18	Carisma	1.3.2.18	2018	Progen Tohum Co.	Progen Tohum Co.	Protected
19	Edessa	1.3.2.19	2018	Progen Tohum Co.	Progen Tohum Co.	-
20	Lydia	1.3.2.20	2018	Progen Tohum Co.	Progen Tohum Co.	-
21	Taban	1.3.2.21	2018	Cotton Research Institute(CRII)	Cotton Research Institute(CRII)	-
22	Parto	1.3.2.22	2018	Cotton Research Institute(CRII)	Cotton Research Institute(CRII)	-
23	May 344	1.3.2.23	2019	May Tohum Co.	May Tohum Co.	-
24	Babylon	1.3.2.24	2020	Golden West Seed Research Co. Inc.	Golden West Seed Research Co. Inc	-
25	Compo	1.3.2.25	2021	Golden West Seed Research Co. Inc.	Golden West Seed Research Co. Inc	-
26	Lider	1.3.2.26	2021	Golden West Seed Research Co. Inc.	Golden West Seed Research Co. Inc	-
27	Esperia	1.3.2.27	2022	Golden West Seed Research Co. Inc	Golden West Seed Research Co. Inc	-
28	Optasia	1.3.2.28	2022	INS Intraseed Ltd.	INS Intraseed Ltd	-
29	Eva	1.3.2.29	2022	American Genetics Inc.	American Genetics Inc.	-
30	AGN117	1.3.2.30	2022	American Genetics Inc.	American Genetics Inc.	-
31	AGN126	1.3.2.31	2022	American Genetics Inc.	American Genetics Inc.	-
32	Lodos	1.3.2.32	2022	Ozaltin Tarım İşletmeleri	Ozaltin Tarım İşletmeleri	-
33	Fakhr	1.3.2.33	2023	CRII -NSTRI	CRII -NSTRI	-
34	Jahesh	1.3.2.34	2023	CRII -NSTRI	CRII -NSTRI	-
35	Malle	1.3.2.35	2023	I.R.IRAN	I.R.IRAN	-
36	May455	1.3.2.36	2023	May-Agro Tohumculuk Sanayi ve Ticaret	May-Agro Tohumculuk Sanayi ve Ticaret	-
37	May505	1.3.2.37	2023	May-Agro Tohumculuk Sanayi ve Ticaret	May-Agro Tohumculuk Sanayi ve Ticaret	-
38	Boran	1.3.2.38	2024	Atlas Tohum Co.	Atlas Tohum Co.	-
39	Turkan	1.3.2.39	2024	Atlas Tohum Co.	Atlas Tohum Co.	-
40	Ayzek595	1.3.2.40	2024	Atlas Tohum Co.	Atlas Tohum Co.	-
41	BA1010	1.3.2.41	2025	ProGen Tohum Co.	ProGen Tohum Co.	-
42	Elpida	1.3.2.42	2025	Golden West Seed Research Co. Inc.	----	-

Objectives of new cotton cultivars introduction are yield increase, earliness, resistance to biotic and abiotic stresses. In spite of introduction of numerous Iranian improved cotton cultivars in Iran during recent years, still considerable cotton cultivation area of Iran belonged to Varamin old and late maturity. Also, new foreign cotton varieties have also been registered, introduced and marketed in Iran for the first time. Therefore, the cultivation of new foreign cotton varieties that are early maturing, high yielding and have good fiber quality is part of the Ministry of Jihad-e-Agriculture's program for development plan for cotton cultivation. Therefore, Jihad-e-Agriculture Ministry programmed sub situation of this cultivars with new cotton early maturity and subsequently new improved and new foreign cotton cultivars introduced. So, the purpose of the paper present a review on cotton new cultivars performance assessment for introduction and commercialization in Iran.

Materials and Methods

For the purpose of the paper is a review on cotton new cultivars performance assessment for introduction and commercialization in Iran, reviewing on Value of Cultivation and Use (VCU) trials results conducted and published as research projects final reports and research papers by Hamidi *et al.* during 2016 to 2023 presented.

Based on Iran's National guideline for Value of Cultivation and Use (VCU) trial for cotton, 17 traits evaluated including seed cotton yield and its components, boll number per plant and each boll weight, earliness, gin turn out and fiber quality

characters, fibers length, fitness, flexibility, strength, uniformity, yellowness (b+) and reflectance degree (RD) and *Verticellium* wilt tolerance are the most evaluated traits in the guideline. fiber length (mm), fiber fineness (in micronare), fiber strength (in g/tex), fiber uniformity (in percentage) and fiber elongation% (in percentage) were determined by HVI (High Volume Instrument) equipment Also, Value of Cultivation and Use (VCU) trial for cotton must be conducted during two years in at least three locations (Seed and Plant Certification and Registration Institute, 2009).

During 2016 to 2025, all new foreign cotton varieties Value of Cultivation and Use (VCU) trials in Iran conducted in four provinces: 1. Golestan province is located in the northern part of Iran, between 35° and 47' to 28° and 8' north latitude and 53° and 8' east Longitude in Caspian sea shore and near Turkmenistan border with average annual precipitation 478 mm and average annual temperature is 19°C, 2. South Khorasan province is located in the eastern part of Iran, between 57° 46' to 57°60' East longitude and 34°14' to 35°30' North latitude with average annual precipitation 77.3 mm and average annual temperature is 23°C, 3. Fars province which is located in southern Iran in 27° and 2' to 31° and 42' latitude and 50° and 42' to 55° and 36' longitude and average annual precipitation 448.5 mm and average annual temperature is 20°C (Darab average annual temperature is 31°C and 4. Ardabil province is located in the north west of Iran, in bordering the Republic of Azerbaijan in 47° and 15' and 48° and 56' East longitude and 37° and 9' and 39° and 42' north latitude and average

annual precipitation 295 mm and average annual temperature is 9°C (Moghan region average annual precipitation 550 mm and

average annual temperature is 18°C), (Fig. 9).

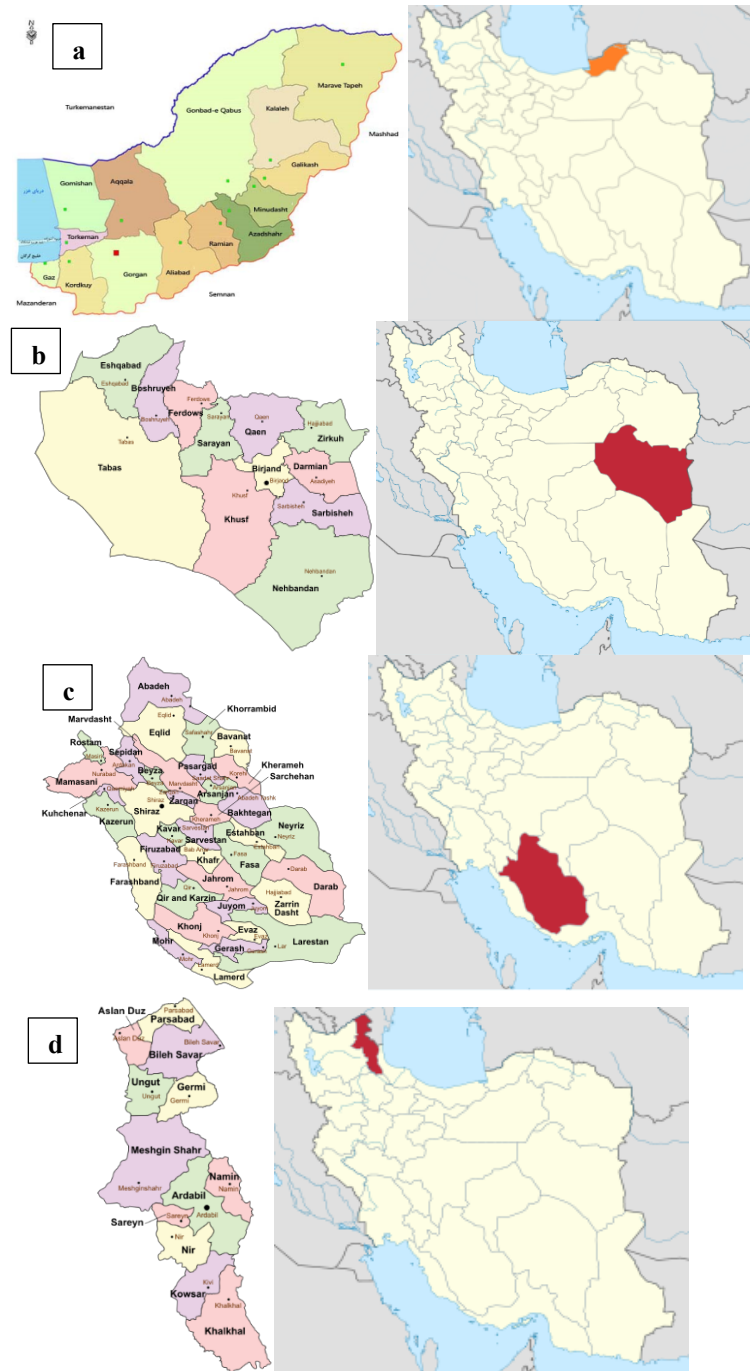


Figure 9- Value of Cultivation and Use (VCU) trials conduction locations in Iran's four provinces: a, Golestan province, b, South Khorasan province, c, Fars province and d, Ardabil province.

New cotton varieties *Verticillium* wilt tolerance assessment conducted by use of *Verticillium dahlia* fungi effective and native inoculum as a pot experiment usually (Fig. 10).



Figure 10- *Verticillium dahlia* fungi inoculum (right) and pot experiment conducted for new cotton varieties *Verticillium* wilt tolerance assessment (left).



Figure 11- Laboratory small scale gin equipment used for seed cotton samples ginning (right) and High Volume Instrument (HVI) equipment (middle and left) used for cotton varieties fiber quality characteristics measurement.

For fiber quality characteristics evaluation each varieties enough fiber sample tasted in two National Reference Cotton Fiber Quality Laboratories in Varamin and Gorgan (Fig. 11) and trials cultivation and fiber quality traits data statistically analyzed by appropriate methods and software (Seed and Plant Certification and Registration Institute, 2009).

Results and Discussion

Results and discussion of the paper composed based on six conducted during 2012 to 2025 Value of Cultivation and Use (VCU) Research Project Reports of Seed and Plants Certification and Registration Institute (SPCRII), including Reg. No.: 51636, 57106, 62844, 65068, 65888, 67120 reports and published and under publication papers.

Nader Arefi and Hamidi (2014) in order to evaluating the Value of Cultivation

and Use (VCU) of various cotton cultivars in Garmsar conditions, a two year experiment was conducted in 2012 and 2013 years, based on complete randomized blocks design by three replications. Evaluated cotton cultivars were: Varamin, Dr. Omumi, Sealand, Ultan, Tabladila, No.210, No.228, Asj.559 and B.557. Evaluated traits were main stem number of nodes, first fruiting node position number, length of five end internodes of main stem, plant height to node height ratio, plant height, boll number per plant, boll weigh, number of locule per boll and seed cotton yield. Result showed that the cultivars were different in all evaluated traits. Tabladila cv. had highest number of bolls per plant and highest seed cotton yield, 3847 kg.ha^{-1} . The lowest seed cotton yield belongs to the Dr. Omumi cv., 1177 kg.ha^{-1} which had the lowest boll per plant. This cultivar had the maximum plant height about 139 cm and the minimum plant height belongs to No.228 cv. There was partly high positive correlation between seed cotton yield and their yield components such as boll per plant, boll weight and number of locule and with some vegetative traits such as first fruiting node position number, length of five end internodes and plant height had weak but negative correlation. Based on results, in conditions which this research performed, Tabladila cv. had higher Value for Cultivation and Use (VCU) and therefore, for cultivation in Garmsar region advisable.

Hamidi *et al.* (2016) in order to evaluation of some cotton new genotypes value of cultivation and use (VCU), five experiment conducted in five province during two years. Experiments locations

and evaluated genotypes including: Golestan province- Cotton Research Institute-Gorgan and 43347, 43259, No 200, Tabladila, Chocurova, B557(CRII871), Sepid 2 genotypes and Sahel cultivar (control), Tehran province-Agriculture and Natural Resources Research Center-Varamin, Khordad, Ultan, 43859, ASJ2×349, R7, No210, No221 and B-557(CRII871) genotypes and Varamin cultivar(control), Khorasan Razavi province-Kashmar agriculture research station, Khordad, Golestan, R7, KC88-01 and KC88-02 genotypes and Varamin cultivar(control), Fars province-Deputy of Fars province Agriculture and Natural Resources Research Center at Darab, T2, Eram3, Golestan, No.200, No.200 Auxiliary, S 492 and n-sk(b-23) genotypes and Bakhtegan cultivar(control) and Semnan province-Garmsar Agriculture Research Station, Dr. Omomi, Ultan, Sealand, Tabladilla, No 210, No 228, Asj.559 and B-557(CRII871) and Varamin cultivar(control). Based on value of cultivation and use test results in Semnan province (Garmsar), Tabladila genotype for cultivation in that region had superior cultivation and use value and therefore recommendable for cultivation in Garmsar region. Also, based on studied agronomic and fiber technological traits and close growth habit KC8801 and KC8802 genotypes in Khorasan Razavi (Kashmar) had superiority. B-557(CRII871) genotype in Golestan province conditions had superior value of cultivation and use. Value of cultivation and use test results in Fars province (Darab) indicated T2 genotype superior than other genotypes and control cultivar. Value of cultivation and use test in Tehran province (Varamin) reveled B-

557(CRII871) at the point of more of important related to cotton value of cultivation traits in comparisons of control cultivar had superiority.

Hamidi *et al.* (2021) have been performed Value of Cultivation and Use (VCU) trial of some Iranian new cotton genotypes and cultivars at Tehran province agriculture and natural resources research and education center at Varamin, based on complete randomized design by four replications during 2016 and 2017. Evaluated cotton genotypes and cultivars include 1) Varamin (control), 2) Khordad (control), 3) Ultan (commercial cultivar), 4) 43259 genotype, 5) A-SJ2×349 genotype, 6) R7 genotype, 7) no. 210 genotype, 8) no. 221 genotype, 9) Leon (foreign commercial cultivar), and 10) Sajedi (new cultivar). Results reveal that Sajedi new cultivar is the earliest cultivar in both years in comparison with other studied genotypes and cultivars. It also has had the most boll number and weight and its seed cotton yield has been in the same statistical group of the highest seed cotton yield control cultivars. The highest lint percentage and fiber elongation% in first year belongs to this cultivar. Therefore, Sajedi new cultivar can be introduced and commercialized for cultivation in Tehran province as well as similar Varamin regions.

Hamidi *et al.* (2022b) in order to evaluate the value of cultivation and use (VCU) of three new upland cotton genotypes, KC8801, KC8802 (introduced as Kashmar and Khorshid new commercial cultivars respectively), and genotype R7 in comparisons to three commercial common cultivars Golestan, Khordad and Varamin (as control cultivars) in Khorasan Razavi

province, a two-year field experiment conducted based on randomized complete blocks design with four replications. Seed cotton yield and its components, earliness index and some related morphological and fiber quality traits were measured during the 2012-2013 year. The results showed that the weight of the bolls was higher in the second year, and the seed cotton yield was higher in the second year and the earliness index was higher in the first year. Also, genotype R7 and the new KC8802 genotype had the highest and the lowest fruiting branches number respectively. Both the Khordad control cultivar and KC8802 new genotype had the highest number of bolls (17 bolls), and the KC8801 new genotype had the highest crown diameter and plant height (120 cm) during two cropping seasons. Also, in both years, Khordad and Golestan control cultivars had the highest, and KC8802 and KC8801 new genotypes had the lowest number of vegetative branches (1.325 and 1.250 in the first year and 1.355 and 1.255 in the second year respectively). The KC8801 new genotype had higher gin turn-out and fiber strength. Therefore, based on the results, higher plant height and less vegetative branches number and a closed canopy structure, KC8802 and KC8801 new genotypes which lead to means that they can be cultivated with a higher plant density cultivation capability in ultra-narrow row cultivation, their higher field performance expected and are suitable for cultivation in Razavi Khorasan province and similar areas.

Also, Hamidi *et al.* (2023c) determined the Value of Cultivation and Use (VCU) of some cotton genotypes in Khorasan-Razavi

province during 2014 and 2015 and investigated in both years, Khordad and Golestan control cultivars had the highest and the new Khorshid and Kashmer genotypes had the lowest number of vegetative branches in the first and second year. Kashmar genotype had higher gin turn out and fiber strength (39.96 % in the first year and 30.48 g/tex strength in the second year, respectively). Based on the results of this research, with due attention to close canopy structure of the and higher plant height and less number of vegetative branches of Khorshid and Kashmer genotypes, these genotypes are suitable and recommendable for cultivation in Razavi Khorasan province and similar areas.

Hamidi *et al.*, (2022d) results showed morphological traits and 30 boll weight and seed cotton yield in second year more than the first year and earliness in second year was more than first year. Also, 30 boll weight and seed cotton yield and fiber quality traits and *Verticillium* wilt tolerance were different. New commercial cultivar, Golestan had the highest seed cotton yield and Sahel old cultivar had the highest boll weight and fiber length, strength and elongation%. Also, Hekmat and Sajedi, the new commercial cultivars had the finest fiber quality and highest *Verticillium* wilt tolerance, respectively. According to the results of this experiment and the importance of *Verticillium* wilt in Golestan province, Sajedi cultivar was suggested for introduction and commercialization as a new commercial cultivar in Golestan province.

Hamidi *et al.*, (2025) in order to six new cotton cultivars and genotypes,

Hekmat, Eram3, Shayan, Cluster Shayan, S492 and n-sk(b-23) in comparisons with Bakhtegan and Golestan common cultivated cultivars value of cultivation and use (VCU) determination in Fars province(Darab) conducted value of cultivation and use (VCU) trial during 2014 and 2015 years, seed cotton yield, boll weight, boll number per plant, earliness, 100 kernel weight, gin turn out, fibers length, fitness, strength, uniformity and elongation% s were evaluated. Results revealed Hekmat cultivar had the most seed cotton yield (4177 kg/ha), boll number per plant (19.5), earliness (94 %), lint percent (35.8%) and fibers fitness (4.2125 Micronair). Bakhtegan cultivar had the most 100 kernel weight (11.2625 gr) and boll weight (5.5 gr) in 2015, fiber length (28.85 mm), uniformity (86.8 %) and elongation% (6.5 %). Also the most fiber strength (31.8 gr/tex) belonged to n-sk (b-23) genotype. Therefore, Hekmat cultivar and Eram3 genotype for seed cotton yield and earliness were superior to studied new cultivars and genotypes and control cultivars and had potential ability for commercialization and introduction as new commercial cultivars in Fars province.

Hamidi (2017) conducted Value of Cultivation and Use (VCU) trials for the purpose of candidate to introduction and release as a new cultivar new genotypes have more importance. Cotton is the most important fiber crops which that cultivation in Iran also very important. Low number cotton commercial cultivars introduced by now and therefore cotton new cultivars introduction is important for cotton cultivation development. In order to evaluation of six new foreign cotton

cultivars Value of Cultivation and Use (VCU) determination, an experiment was conducted at four provinces, South Khorasan (Birjand), Fars (Darab), Golestan (Anbar Oloom) and Ardabil (Moghan) based on complete randomized design by four replications. New foreign studied cultivars were: Carisma, 2-Lydia, 3-PG2018, 4-BA440, 5-Flash and 6-Edesa and also, control cultivars were: Varamin (South Khorasan and Ardabil), Khordad (South Khorasan), Latif and Sahel cultivars (Golestan), Bakhtegan and Golestan cultivars (Fars) and Mehr (Ardabil). Based on National Guideline for Testing Value for Cultivation and Use of Cotton, seed cotton yield, boll number per plant, boll weight, earliness, lint percent, fibers length, fitness, elongation%, strength, reflectness and yellowness were measured. Totally, based on research results, Lydia cultivar because its high seed cotton yield and boll weight and some fiber quality traits, that cultivar cultivation in South Khorasan province recommendable. Also for the reason higher seed cotton yield and more earliness and lint percent and more tolerance to Verticellium wilt of BA440 cultivar, that cultivar cultivation is recommendable for Golestan province. Based on results of research in Fars province and because of Carisma cultivar high susceptibility to Verticellium wilt, Lydia cultivar cultivation was recommended for Fars province. Also Flash and Lydia cultivars cultivation in Ardabil province recommended.

Hamidi (2022) in order to evaluation of four new foreign cotton cultivars Value of Cultivation and Use (VCU) determination, two experiments was conducted as complete

randomized design by four replications at four provinces, South Khorasan (Birjand), Fars (Darab), Golestan (Anbar Oloom) and Ardabil (Moghan). New foreign evaluated cultivars in conducted trial during 2017 and 2018 years were: 1- May344, 2- Lider, 3- Ranjer and 4- Ceyhan520 and new foreign evaluated cultivars in conducted trial during 2018 were: 1-Maxa (Campo) and 2-Leon (Babylon). Also, control cultivars were: Varamin (South Khorasan and Ardabil provinces), Khordad (South Khorasan province), Latif and Golestan cultivars (Golestan province), Bakhtegan and Golestan cultivars (Fars province) and Mehr (Ardabil). Based on National Guideline for Testing Value for Cultivation and Use of Cotton, evaluated traits were: 1- seed cotton yield, 2- earliness, 3- boll number per plant, 4- boll weight, 5-lint percent, 6- fibers length, 7-fibers fitness, 8- fibers elasticity, 9-fibers strength and 10- fibers uniformity. Based on conducted Value of Cultivation and Use (VCU) trials, new foreign cotton cultivar May344 in terms of cotton seed yield, new foreign cotton variety Ranjer for earliness, boll weight, lint percent, fibers uniformity and elasticity, new cotton foreign cultivar Lider regarding fibers strength and fitness and Ceyhan520 new foreign cotton cultivar prospect of fibers elongation% beside of control and other evaluated cultivars were superior. Also, Maxa and Leon new foreign cotton cultivars respectively in terms of earliness and fibers uniformity were superior to control cultivars and for other evaluated cultivation and use traits had not significant difference with control cultivars. Therefore, for the reason of superiority of new foreign cotton cultivar Ranjer for earliness and some fibers quality traits, recommendable for cultivation in

South Khorasan province as a new cotton cultivar. Bakhtegan and Golestan control cotton cultivars in Fars province (Darab), in terms of seed cotton yield were superior to new foreign evaluated four cultivars. Also, Ceyhan520 new cotton cultivar for earliness and fibers elongation% and fibers strength in first year (2017) had superiority to control cultivars. May344 new foreign cultivar regarding to lint percentage and fibers fitness superior to control cultivars and Lider new foreign cultivar for fibers elasticity and strength in first year (2017) was superior to control cultivars. Control cultivars in Fars province, in terms of earliness were superior to two evaluated new cotton cultivars, Maxa and Leon. Also, Maxa and Leon new foreign cultivars in terms boll number were superior to control cultivars. Therefore, considering to importance of earliness for cotton cultivation in Fars province which cotton mainly cultivated as a second cultivated crop after cereals harvest and superiority of some fibers technology quality traits, Ceyhan520 and May344 new foreign cultivars cultivation recommendable for cultivation as new cultivars in Fars province. Results revealed, new foreign cultivar Ranjer and control cultivar Mehr in terms of seed cotton yield superior than other evaluated cultivars. Also Mehr control cultivar was the most early maturity cultivar and among evaluated foreign cultivars new foreign cultivar May344 was the most early maturity cultivar. Ranjer and May344 are new foreign cultivars for boll weight and lint percent superior to other cultivars and regarding to fibers strength Lider and Ceyhan520 cultivars superior to control cultivars. Also Varamin control cultivar and May344 new foreign cultivar in terms of

fibers length were superior to other cultivars. Leon new foreign cultivar for cotton seed yield, earliness and boll weight and Maxa new foreign cultivar in terms of boll number were superior to control cultivars. Varamin control cultivar and Leon new foreign cultivars regarding to fibers length were superior to other evaluated cultivars. Therefore, new cotton foreign cultivars, Ranjer, May344 and Leon were recommendable for cultivation in Ardabil province (Moghan) as a new cotton cultivar. Also, based on evaluation of evaluated cultivars tolerance to *Verticillium* wilt, considering to Ceyhan520 cultivar very sensitive, and sensitivity of May344, Ranjer, Lider and Leon to *Verticillium* wilt, those cultivars are not recommendable to cultivation in contaminated areas soil to the disease fungi pathogen.

Hamidi *et al.*, (2020) determined Value of Cultivation and Use (VCU) of six cotton new Turkey origin cultivars including Carisma, Lydia, PG2018, BA440, Flash and Edesa cultivars in comparison with Bakhtegan and Golestan cultivars as control in Fars province (Darab) evaluated during 2017 and 2018 years by determination of seed cotton yield and its components (boll number per plant and one boll weight), earliness and fiber quality characters including fibers percent, length, fitness, flexibility, strength, uniformity, yellowness and brightness and *Verticellium* wilt tolerance. Results showed studied traits affected by environment conditions during trial conduction years. So fibers flexibility, strength and yellowness were during first year were more and fibers uniformity was more during second year. New foreign cultivars Carisma in first year and Lydia in

second year had the highest seed cotton yield and fiber percent respectively and PG2018 cultivar was the earliest cultivar. Lydia and Edessa cultivars had the most fiber flexibility. Also Lydia and Carisma cultivars had the most fiber strength and uniformity. Bakhtegan and Lydia one boll weight was more than other cultivars in first year and BA440 cultivar one boll weight was more than other cultivars during second year and Bakhtegan one boll weight was low than other cultivars in second year. Golestan control cultivar had the most fiber length and fittest and Lydia cultivar had the highest fiber brightness. Also, BA440 and Lydia were the most tolerant to *Verticellium* wilt cultivars. Based on the trial results new foreign cultivars Carisma, Lydia and PG2018 had desired cultivation and use traits for recommendation due to cultivation in Fars province but with due attention to high importance of high tolerance to *Verticellium* wilt of cultivars for cultivation of cotton in Fars province, Lydia new foreign cultivar due to relatively higher tolerance to *Verticellium* wilt, is recommendable for cultivation in Fars province.

Hamidi *et al.*, (2022a) evaluated Value of Cultivation and Use (VCU) of six new Turkish cotton varieties, including Carisma, Lydia, PG2018, BA440, Flash and Edesa, compared to Latif and Sahel varieties as control in Golestan province, evaluated in 2016 and 2017 by determining cotton seed yield and its components (number of bolls per plant and weight of a boll), earliness and fiber quality, including fiber percentage, length, fitness, flexibility, firmness, uniformity, yellowing and brightness, and *Verticellium* wilt tolerance.

Combined analysis of variance over time showed that seed cotton yield, ginning performance, length, fineness, strength, uniformity, and fiber yellowing were significantly different among years of the experiment. In addition, the tested varieties differed significantly in terms of cotton seed yield, boll weight, ginning performance, fiber length, fineness and strength, and the interaction effect of variety $\times$ year was significant for fiber elongation% and reflectance. The new foreign variety PG2018 was the earliest maturing variety with a duration of 96.25 days from planting to full boll opening in the first year. The fineness, strength and uniformity of the fibres in the second year were higher than in the first year. The new foreign variety PG2018 had the highest grain yield, and this variety had the lowest fiber length. The fibers of the new foreign varieties Lydia and BA440 had the highest strength. The new foreign variety PG2018 had the highest cotton seed yield in the first year (3705.3 kg/ha). The fibers of the new foreign variety Edesa had the highest elongation% in the first year. The new foreign variety Lydia had the highest fiber reflectance in the first year. In addition, the new foreign varieties BA440 and Lydia were the most tolerant varieties to *Verticillium* wilt. Based on the results of this study, among the six new foreign cotton varieties evaluated, the new foreign varieties BA440 and Lydia are recommended as new varieties for cultivation in Golestan province, considering the cotton seed yield and earliness of the new foreign variety PG2018, as well as ginning performance and tolerance to *Verticillium* wilt. In addition, these varieties should be

prioritised as new varieties for cultivation in Golestan province.

Hamidi *et al.* (2022b) research conducted in order to study and comparisons of seed cotton yield and its components and some fiber quality traits of new foreign upland cotton varieties through Value of Cultivation and Use (VCU) trial evaluation in Ardabil province Moghan plain. The purpose of the research was introduction and commercialization of superior cultivars for substitution of the region cotton old late maturity and obsolete common cultivars for cultivation. They evaluate Value of Cultivation and Use (VCU) of six new Turkey origin upland cotton cultivars including Carisma, Lydia, PG2018, BA440, Flash and Edesa cultivars in comparison with Varamin and Mehr cultivars as control in Ardabil province (Moghan plain) evaluated during 2016 and 2017 years by determination of seed cotton yield and its components (boll number per plant and one boll weight), earliness and some fiber quality characters including fibers percent, length, fitness, flexibility, strength, uniformity, yellowness and reflectance degree. Results revealed that Lydia seed cotton yield in 2017 year was more than other cultivars. Mehr and Flash cultivars were earliest cultivars respectively in both years. Edesa and Varamin cultivars had the most boll weight respectively in 2016 and 2017 years. Flash and Varamin cultivars in comparisons with other cultivars had the most and lowest boll number of each plant respectively in 2016 and 2017 years. Also, Flash and Varamin cultivars had the fiber length in comparisons with other cultivars respectively in 2016 and 2017 years.

Fiber fitness of Lydia cultivar was superior to other cultivars and Flash and Lydia cultivars fiber strength was more than other cultivars in 2016 and 2017 years respectively. Based on the trial results new foreign cultivar Lydia in order to having the most seed cotton yield, earliness and fiber fitness and Flash cultivar due to more earliness and having the most fiber length, strength and brightness in comparison with other evaluated new foreign upland cotton cultivars and control cultivars had desired cultivation and use traits for recommendation to cultivation in Ardabil province (Moghan plain) instead of Varamin late maturity common cultivar and for substitution of Mehr obsolete variety. Therefore, based on conducted Value of Cultivation and Use (VCU) trial results new foreign upland cotton cultivars, Lydia and flash was recommended as new commercial cultivars for cultivation in Ardabil province (Moghan region).

Hamidi *et al.* (2022) In order to evaluation of two new foreign(Greek) upland cotton cultivars Value of Cultivation and Use(VCU) evaluation, during 2018 a trial was conducted as complete randomized blocks design by four replications at three provinces, South Khorasan (Birjand), Fars(Darab), and Ardabil(Moghan). Control common improved commercial upland cotton cultivars were: Varamin and Khordad cultivars (South Khorasan province), Bakhtegan and Golestan cultivars (Fars province) and Varamin and Mehr cultivars (Ardabil province). Based on National Guideline for Testing Value for Cultivation and Use of Cotton, evaluated traits were: 1- seed cotton yield, 2- earliness, 3- boll

number per plant, 4- boll weight, 5-lint percent, 6- fibers length, 7-fibers fitness, 8-fibers elongation%, 9-fibers strength and 10- fibers uniformity. Based on trials results, in south Khorasan province (Birjand) new Greek cultivars Maxa and Leon respectively in terms of earliness and fibers uniformity were superior to control cultivars. In Fars province (Darab), control cultivars more early maturity than Maxa and Leon new foreign cultivars. Also, Maxa and Leon new cultivars superior than control cultivars in terms of boll number and Maxa new foreign cultivar regarding to fiber uniformity and elongation% superior than control cultivars. Based on the research results, in Ardabil province (Moghan) Leon new foreign cultivar for seed cotton yield, earliness index and boll weight and Maxa new foreign cultivar in terms of boll number were superior to control cultivars. Also Varamin control cultivar and Leon new foreign cultivars regarding to fibers length were superior to other evaluated cultivars. Therefore, Leon new cotton foreign cultivar cultivation as a new cultivar recommendable in Ardabil province (Moghan).

Hamidi *et al.* (2024a) research was carried out to evaluate and compare the seed cotton yield and its components and some fiber qualitative characteristics of six new Turkey origin cotton varieties including Carisma, Lydia, PG2018, BA440, Flash, and Edesa cultivars in comparison with Varamin and Khordad cultivars as the control varieties through Value of Cultivation and Use (VCU) trial in South Khorasan province in Birjand Mohammadieh agriculture research station during 2016-2017 and 2017-218 crop years

by determination of seed cotton yield and its components (boll number per plant and one boll weight), earliness and fiber quality characters including fibers percent, length, fitness, flexibility, strength, uniformity, yellowness(b+) and reflectance degree(RD) and *Verticellium* wilt tolerance commercialize these cultivars. Combined analysis of variance in time showed that seed cotton yield, boll numbers, boll weight, length, fineness, elongation%, strength, uniformity, and reflectance of fibers showed year×cultivar were significant for boll number and fiber reflectance. Also, seed cotton yield, boll weight, and fiber uniformity in the first year were more than in the second year and Varamin and Khordad control cultivars had more boll numbers in the second year. The Varamin control cultivar had the finest fibers and the Lydia foreign cultivar and the Varamin control cultivar had the most and lowest fiber elongation% respectively. Lydia foreign cultivar having 33.55 and Carisma having 29.1375 gr/tex had the most and lowest strength respectively. The most and lowest fiber reflectance belonged to the Lydia foreign cultivar and Varamin control cultivar in the first year respectively. PG2018 foreign cultivar and Varamin control had the most and lowest gin turn out respectively. Varamin and Khordad control cultivars had the lowest and the most fiber yellowness. Varamin control cultivar having 5.720 Lydia foreign cultivar having 5.645 tons per hectare and Carisma foreign cultivar having 4.625 tons per hectare had the lowest seed cotton yield. The most boll weight belonged to the Varamin control cultivar and Lydia foreign cultivar having 5.720 and 5.645 gr respectively. Varamin and Khordad control

cultivars were the late early and earliest maturity cultivars having 100 and 87 days from planting to full boll opening among the studied cultivars. Also, BA440 and Lydia foreign cultivars were the most tolerant and the most sensitive to Verticillium wilt cultivars. According to the results, the control cultivars Varamin and Khordad outperformed the studied foreign cultivars in terms of seed cotton yield, yield components, and earliness. Additionally, among the six new foreign cotton cultivars evaluated in this research, Lydia exhibited superior characteristics, including seed cotton yield, boll weight, and several fiber quality attributes such as fiber strength and reflectance. Moreover, Lydia demonstrated a high tolerance to Verticillium wilt. Based on these findings, we recommend Lydia as a suitable choice for commercial cotton cultivation in South Khorasan province and similar regions.

Hamidi (2020) for evaluation of six new foreign cotton cultivars Value of Cultivation and Use (VCU) determination, two experiments were conducted as complete randomized design by four replications at four provinces, South Khorasan (Birjand), Fars (Darab), Golestan (Anbar Oloom) and Ardabil (Moghan). New foreign evaluated cultivars in conducted trial during 2017 and 2018 years were: 1- May344, 2- Lider, 3- Ranjer and 4- Ceyhan520 and new foreign evaluated cultivars in conducted trial during 2018 were: 1- Babylon and 2- Compo. Also, control cultivars were: Varamin (South Khorasan and Ardabil provinces), Khordad (South Khorasan province), Latif and Golestan cultivars (Golestan province), Bakhtegan and Golestan cultivars (Fars province) and Mehr (Ardabil). Based on

National Guideline for Testing Value for Cultivation and Use of Cotton, evaluated traits were: 1- seed cotton yield, 2- earliness, 3- boll number per plant, 4- boll weight, 5- lint percent, 6- fibers length, 7- fibers fitness, 8- fibers elasticity, 9- fibers strength and 10- fibers uniformity. Based on conducted Value of Cultivation and Use (VCU) trials, new foreign cotton cultivar May344 in terms of cotton seed yield, new foreign cotton variety Ranjer for earliness, boll weight, lint percent, fibers uniformity and elongation%, new cotton foreign cultivar Lider regarding fibers strength and fitness and Ceyhan520 new foreign cotton cultivar prospect of fibers elongation% beside of control and other evaluated cultivars were superior. Also, Babylon and Leon new foreign cotton cultivars respectively in terms of earliness and fibers uniformity were superior to control cultivars and for other evaluated cultivation and use traits had not significant difference with control cultivars. Therefore, for the reason of superiority of new foreign cotton cultivar Ranjer for earliness and some fibers quality traits, recommendable for cultivation in South Khorasan province as a new cotton cultivar. Bakhtegan and Golestan control cotton cultivars in Fars province (Darab), in terms of seed cotton yield were superior to new foreign evaluated four cultivars. Also, Ceyhan520 new cotton cultivar for earliness and fibers elongation% and fibers strength in first year (2017) had superiority to control cultivars. May344 new foreign cultivar regarding to lint percentage and fibers fitness superior to control cultivars and Lider new foreign cultivar for fibers elongation% and strength in first year (2017) was superior to control cultivars. Control cultivars in Fars province, in terms

of earliness were superior to two evaluated new cotton cultivars, Babylon and Leon. Also, Babylon and Leon new foreign cultivars in terms boll number were superior to control cultivars. Therefore, considering to importance of earliness for cotton cultivation in Fars province which cotton mainly cultivated as a second cultivated crop after cereals harvest and superiority of some fibers technology quality traits, Ceyhan520 and May344 new foreign cultivars cultivation recommendable for cultivation as new cultivars in Fars province. Results revealed, new foreign cultivar Ranjer and control cultivar Mehr in terms of seed cotton yield superior than other evaluated cultivars. Also Mehr control cultivar was the most early maturity cultivar and among evaluated foreign cultivars new foreign cultivar May344 was the most early maturity cultivar. Ranjer and May344 new foreign cultivars for boll weight and lint percent superior to other cultivars and regarding to fibers strength Lider and Ceyhan520 cultivars superior to control cultivars. Also Varamin control cultivar and May344 new foreign cultivar in terms of fibers length were superior to other cultivars. Leon new foreign cultivar for cotton seed yield, earliness and boll weight and Babylon new foreign cultivar in terms of boll number were superior to control cultivars. Varamin control cultivar and Leon new foreign cultivars regarding to fibers length were superior to other evaluated cultivars. Therefore, new cotton foreign cultivars, Ranjer, May344 and Leon were recommendable for cultivation in Ardabil province (Moghan) as a new cotton cultivar. Also, based on evaluation of evaluated cultivars tolerance to Verticillium wilt, considering to Ceyhan520 cultivar

very sensitive, and sensitivity of May344, Ranjer, Lider and Leon to Verticillium wilt, those cultivars are not recommendable to cultivation in contaminates areas soil to the disease fungi pathogen.

Hamidi (2024) evaluate and determine the value of cultivation and use (VCU) of four new foreign upland cotton varieties: 1- May455, 2- May505, 3- PRG9048 and 4- PRG9811, and was conducted an experiment as a randomized complete block design with 4 repetitions and during 2021 and 2022 years in 4 provinces: 1- South Khorasan (Birjand- Mohammadi Agricultural Research Station), 2- Golestan (Gonbad Kavos Agricultural Research Station, Golestan Province Agricultural and Natural Resources Research and Education Center), 3- Fars at Darab- the first year of trial in Bakhtajerd Fars Province Agriculture and Natural Resources Research and Education Center Agricultural Research Station and the second year of Fajr Sabz Middle East Company farm in Marian Darab village and 4- Ardabil (Maghan - Agriculture and Natural Resources Research and Education Center). In order to carry out the trial, at the end of May of the year of the project implementation, when the weather conditions are favorable and the suitable date for cotton cultivation in the locations (early to mid-May), the seeds of new cultivars of upland cotton, respectively, May455 and May505 cultivars, origin Turkey (cultivar owner the MAY Tohumculuk Company) and PRG9048 and PRG9811 cultivars, origin Greece: (cultivar owner the Bios Agrosystems Company), two common control cultivars in each region, respectively: 7- Varamin and 8-

Khordad (common cultivars in South Khorasan province), 9- Golestan and 10- Armaghan (common cultivars in Fars province), 11- Latif and 12- Golestan (common cultivars in Golestan province), 13- Varamin and 14- Armaghan and 15- May 344 (common cultivars in Ardabil province(Maghan region) and 16-Shayan common control cultivar in all trials locations were cultivated in the field according to the national guidelines for determining the agronomic value of cotton varieties. The traits evaluated according to the national guidelines for value of cultivation and use (VCU) were: 1- seed cotton yield (kg/ha), 2- boll number, 3- boll weight (gr), 4- earliness, 5- gin turn out, 6- fiber length, 7- fiber fineness, 8- fiber strength, 9- fiber uniformity, 10- fiber elongation, 11- fiber reflectance degree, and 12- fiber yellowness. The results praised the new foreign cultivar May 455 in terms of seven agronomic and fiber quality traits, the May 505 cultivar in terms of five cultivation and fiber quality traits, and PRG9048 and PRG9811 cultivars respectively in terms of five and seven agronomic and fiber quality traits compared to Shayan common and other control cultivars had superiority. Stability analysis and genotype $\times$ environment interaction effect using Biplot GGE software and AMMI method also showed that Birjand (South Khorasan) was the most favorable environment (location) investigated in terms of yield stability and the cultivars under study. Also, the new foreign cultivars May455 and PRG9811 had the first and second ranks of yield stability, respectively, in terms of yield stability based on the evaluated yield stability CRITERIA. Therefore, all four new foreign studied

cultivars had the deserved to be introduced as new foreign cultivars and to include their names in the national list of plant varieties.

Hamidi *et al.* (2024b) evaluate and determine the value of cultivation and use (VCU) of the six new foreign upland cotton cultivars: 1- Stella, 2- Tesla, 3- AGN126, 4- AGN112, 5- AGN117 and 6- Lodus in comparisons of three common cultivated commercial control cultivars Latif, Golestan and Shayan the research was conducted as a complete randomized blocks design with 4 repetitions during 2020 and 2021 years Golestan (Gonbad Kavoos) province The evaluated traits were: 1-Seed cotton yield, 2-Boll number, 3-Boll weight, 4-Earliness, 5-Gin turn out, 6-length, 7-Fitness, 8-Elongation, 9-Strength, 10- Uniformity, 11- Brightness and 12- Yellowness of fibers and 13- Cultivars tolerance to Verticillium wilt disease. The results revealed each of new foreign cultivars AGN112 and AGN117 with having three superior traits: 1- gin turn out, 2- strength and 3- elongation of fibers and 1- seed cotton yield, 2- boll weight and 3- fiber elongation respectively were superior than control and other studied foreign cultivars but because of AGN112 new foreign cultivar susceptibility to Verticillium wilt disease and Golestan province soils contamination to the disease caused fungus, only AGN117 as a new foreign cultivar cultivation in Golestan province recommendable.

Hamidi *et al.* (2023) in order to evaluation of two new foreign (Greek) upland cotton cultivars Value of Cultivation and Use(VCU) evaluation, during 2018 conducted a trial as complete randomized blocks design by four

replications at three provinces, South Khorasan (Birjand), Fars (Darab), and Ardabil (Moghan). Control common improved commercial upland cotton cultivars were: Varamin and Khordad cultivars (South Khorasan province), Bakhtegan and Golestan cultivars (Fars province) and Varamin and Mehr cultivars (Ardabil province). Based on National Guideline for Testing Value for Cultivation and Use of Cotton, evaluated traits were: 1- seed cotton yield, 2- earliness, 3- boll number per plant, 4- boll weight, 5- gin turn out, 6- fibers length, 7- fibers fitness, 8- fibers elongation%, 9- fibers strength and 10- fibers uniformity. Based on trials results, in south Khorasan province (Birjand) new Greek cultivars Babylon and Compo respectively in terms of earliness and fibers uniformity were superior to control cultivars. In Fars province (Darab), control cultivars more early maturity than Babylon and Compo new foreign cultivars. Also, Babylon and Leon new cultivars superior than control cultivars in terms of boll number and Babylon new foreign cultivar regarding to fiber uniformity and elongation% superior than control cultivars. Based on the research results, in Ardabil province (Moghan) Compo new foreign cultivar for seed cotton yield, earliness index and boll weight and Babylon new foreign cultivar in terms of boll number were superior to control cultivars. Also Varamin control cultivar and Compo new foreign cultivars regarding to fibers length were superior to other evaluated cultivars. Therefore, Leon new cotton foreign cultivar cultivation as a new cultivar recommendable in Ardabil province (Moghan).

Nejatnejad *et al.* (2025) to evaluate and compare the seed cotton yield, fiber quality and earliness of introduced and Iranian new upland cotton cultivars field experiments were conducted in two consequent growing seasons 2019-20 and 2020-21 in three provinces Ardabil (Moghan), South Khorasan (Birjand) and Fars (Darab) using randomized complete block design with four replications. Nine cotton cultivars including six introduced cultivars; Agn112, Agn117, Agn126, Speria, Tesla and Lodos and three Iranian cotton cultivars; Shayan, Armaghan and Golestan (control) were evaluated. Seed cotton yield and its components, boll number, boll weight, and fiber quality characters including fibers fineness, length, uniformity, strength, elongation, reflectance, yellowness and gin turn out as well as earliness was determined (days from planting to the opening of 60% of bolls of each plot). Results of combined analysis of variance showed that the seed cotton yield and fiber quality were affected by cultivar, year and location at the 1% probability level. The highest seed cotton yield ($4189.9 \text{ kg.ha}^{-1}$), fiber fineness (4.73 micronair) and fiber strength (33.4 g.tex^{-1}), earliness (116.5 days) and the lowest yellowness (7.98) belonged to the cv. Agn117. Seed cotton yield had positive and significant correlation with the number of bolls ($r = 0.91^{***}$) and fiber fineness ($r = 0.80^{**}$) and negative and significant correlation with fiber yellowness ($r = -0.87^{**}$). Comparison of introduced and Iranian cultivars showed that introduced cultivars had higher mean seed cotton yield and boll number, and was late maturity as well as more gin turn out than Iranian cultivars. Cluster and biplot analysis results showed cv. Agn117 as the superior cultivar.

Boll weight and number, earliness, gin turn out and fiber fineness were identified as determinant traits for improvement of seed cotton yield and fiber quality. These traits can be used for evaluation and selection of new improved cotton cultivars. Also, based on the results of this experiment the cv. Agn117 can be a suitable substitute for Iranian cotton cultivars in cotton growing areas in Iran.

Hamidi (2025) evaluate and determine the Value of Cultivation and Use (VCU) of 10 new foreign Upland- cotton varieties: 1- Marlyn (origin Spain), 2- Lazer (origin Turkey-Progen Company), 3- Armada (origin Turkey-Progen Company), 4- BA1010 (origin Turkey-Progen Company), 5- Lima (origin Turkey-Progen Company), 6- Bomba (origin Greece-Golden West Company), 7- Elpida (origin Greece-Golden West Company), 8- Turkan (origin Turkey-Atlas Tohum Ziraat Company), 9- Boran (origin Turkey-Atlas Tohum Ziraat Company), and 10- Ayzek595 (origin Turkey-Atlas Tohum Ziraat Company) Tohum Ziraat), the trial is carried out in a randomized complete block design with 4 replications during 2022 and 2023 years in 4 provinces, 1- South Khorasan (Birjand-Mohammadiyeh Agricultural Research Station), 2- Golestan (Gonbad-Kavoos Agricultural Research Station, Golestan Province Agricultural Research and Education Center), 3- Fars (Darab-Marian Station, Fajr Sabz Middle East Company), and 4- Ardabil (Moghan-Agricultural and Natural Resources Research and Education Center). In order to carry out the trial, during trial conduction years, when the weather conditions are favorable and the appropriate cotton planting date comes in

each region (early to mid-May onwards), the seeds of the new foreign medium-tenacity cotton varieties mentioned above, along with two commonly cultivated control varieties, are planted in each region, respectively: 7- Varamin and 8- Khordad (commonly cultivated varieties in South Khorasan Province), 9- Golestan and 10- Armaghan (commonly cultivated varieties suitable for Fars Province), 11- Latif and 12- Golestan (commonly cultivated varieties in Golestan Province), 13- Varamin and 14- Armaghan and 15- May344 (commonly cultivated varieties in Ardabil-Moghan), and 16- Shayan variety as a common control variety in four trial locations, 10 new foreign varieties and 3 control varieties are planted in the field and according to the national guidelines for determining the cotton varieties Value of Cultivation and Use (VCU) trial: 1- Seed cotton yield (kg/ha), 2- Boll number per plant, 3- Boll weight (gr), 4- Earliness (days number from planting to 60 % of bolls opening per plot), 5- Gin turn out (%), 6- Fiber length, 7- Fiber fineness, 8- Fiber strength, 9- Fiber uniformity, 10- Fiber elongation%, 11- Fiber reflectance degree indicator(%), and 12- Fiber yellowness indicator(%) traits evaluated. The obtained data were statistically analyzed as combined time and location analysis of variance, for the purpose determination of superior variety or varieties in terms of Value of Cultivation and Use (VCU) traits. Results of data combined time and location analysis of variance showed in both years and four trial locations among studied new foreign cultivars, the Buran cultivar was superior in terms of seed cotton yield and the Merlin cultivar was superior in terms of fiber quality in both years and four test

locations to other foreign cultivars and the common control cultivar. Therefore, the new foreign cultivars Buran and Merlin were recommended for cultivation in different regions. Results of the analysis of stability and the interaction effect of genotype $\times$ environment on seed cotton yield using the GGE biplot method indicated that the new foreign cultivar Buran in the Darab region in the first and second years of the test, in the Moghan region in the first and second years of the test, and in the Gonbad-Kavoos region in the first year of the test, the new foreign cultivar BA1010 in Darab in the first and second years of the test, and the new foreign cultivar Ayzak595 were the most suitable for planting in terms of seed cotton yield in the Birjand region in the first and second years of the test. Also, the new foreign variety Buran and the common control variety Shayan had the highest and lowest seed cotton yield stability and were the most suitable varieties among the varieties studied, respectively. The results of stability analysis and the interaction effect of genotype $\times$ environment on the yield of sorghum using the GGE biplot method indicated that the new foreign variety Buran in the Darab region in the first and second years of the test, in the Moghan region in the first and second years of the test, and in the Gonbad-Kavoos region in the first year of the trial, the new foreign variety BA1010 in Darab in the first and second years of the trial, and the new foreign variety Ayzak595 were the most suitable in terms of seed cotton yield in the Birjand region in the first and second years of the trial for cultivation. Also, the new foreign variety Buran and the common control variety Shayan had the highest and lowest seed cotton yield

stability and were the most suitable varieties among the varieties studied, respectively.

Conclusion:

Crop cultivars are the most important factor in crop optimum quantity and quality products achievement and cotton is one of the most industrial crops. Objectives of new cotton cultivars introduction are yield increase, earliness, and resistance to biotic and abiotic stresses. Therefore the purpose of cotton improvement is the introduction of high yielding new cultivars having the potential of fiber high quality, early maturity, and resistance to biotic and abiotic stresses. Farmers access to crops new improved cultivars for optimum quantity and quality crop production is very important. Value of Cultivation and Use (VCU) of new cultivars must be assessed and compared with common cultivars through Value of Cultivation and Use (VCU) trials before introduction to farmers. Based on the Islamic Republic of Iran Act of Plant Varieties Registration, Control and Certification of Seed and Plant Material, as developed countries in Iran new improved plants varieties registration conducted in the technical international framework of International Union for the Protection of New Varieties of Plants (UPOV) protocols by Distinctness Uniformity and Stability (DUS) trials. Also, for introduction and release of cultivated main crops new varieties like as cotton, conduction of Value of Cultivation and Use (VCU) trials is necessary. So, for introduction and release of new cotton improved varieties in Iran and based on National Guideline for Testing Value for Cultivation and Use of Cotton by now five Iranian improved by Iran Cotton

Research Institute (CRII) and 22 foreign tetraploid upland cotton varieties which were all of them originated from Turkey and Greece countries Value of Cultivation and Use (VCU) trials conducted and adaptability of them evaluated in four man cotton cultivation areas during two years and approved by Iran's National Plants Varieties Introduction Committee (National Board). Also, now 13 new foreign tetraploid upland cotton varieties and 3 improved by Iranian private sector new tetraploid upland cotton varieties under Value of Cultivation and Use (VCU) trials conduction for introduction and release.

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Content

A REVIEW ON COTTON NEW CULTIVARS PERFORMANCE ASSESSMENT FOR INTRODUCTION AND COMMERCIALIZATION IN IRAN

Aidin Hamidi and Mohammadreza Ramazani Moghaddam

1

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