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Response of yield and economic feasibility to various cropping module under different season at district Kaushambi

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Abstract
An On farm trial conducted on evaluation of different cropping module n irrigated condition were taken up under Krishi Vigyan Kendra Kaushambi during the year 2016-17 to 2017-18. The study revealed that performance of Maize (for Cob)- Early Potato-(K-Ashoka)-Late Wheat-(DBW-14)-Moong-(PDM-139) was more effective in respect of equivalent yield (311.45 Q/ha.) with high economic return followed by Sesame –(Sekhar) –Early Potato(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139)-243.50 Q/ha., Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14) -208.12 Q/ha., Rice(Hybrid/PHB-71) –Wheat (PBW-343)- Moong (PDM-139)-119.2 Q/ha. Rice (HybridPHB-71)-wheat (PBW343) 106.45 Q/ha. Cropping module. Maize (forCob)-Potato-(K-Ashoka-Late Wheat (DBW-14)-Moong -(PDM-139) cropping modulegave 192.94% higher equivalent yield followed by Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139)--120.6% , Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)-95.79%, 12.18%higher equivalent yield over Rice-wheat cropping system.Net profit was maximum obtained Rs. 239995/ha with Treatment T1-Maize (forCob)-Potato-(K-Ashoka-LateWheat (DBW-14)-Moong-PDM-139) followed by Rs. 176165/ha inT2-Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139), Rs169280/ha in T3 Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)and Rs.130760/ha in T4 Rice(Hybrid/PHB-71) –Wheat (PBW-343)- Moong (PDM-139) over rice wheat cropping system Rs. 99394.5/ha.. Maximum Benefit cost ratio 3.5/ha was obtained in Maize (for Cob)-Potato-(K-Ashoka-LateWheat-DBW-14-Moong-PDM-139 cropping module followed by 3.04 in Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139), 3.02 in Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)- while Rice-Wheat cropping system gave B:C ratio 2.5.

Keywords: Maize, rice, veg. pea, sesame, yield and economics

Introduction
Rice-wheat is main cropping systems in north India as well as district Kaushambi. District Kaushambi cover near about 45000 ha under Rice-Wheat system. This system are widely adopted by the farmer due to stable production and less labour requirement (Kumar *et al.*, 2001) [4]. But continue adoption of these cropping systems had led to the problem of specific weeds, reduced soil fertility in specific root zone, development of soil sickness and infestation of similar kind of pest which ultimately resulted in decline the in terms of production and net return (Katyal 2003 and Kumar and Yadav 2005) [2, 3]. Maize for (Cob)-Potato-(K-Ashoka-LateWheat-DBW-14-Moong-PDM-139cropping systems are found most efficient cropping system as compare to rice-wheat cropping system. The inclusion of pulses, garlic, oil seeding Kharif and vegetable in rabi season are found more beneficial than cereal after cereal (Kumpawat 2001) [5]. It is easy to replace the rice by other highe value crop in rainy season due to soil and climatic condition of Kaushambi district. Keeping above facts in view present experiment was to assess the different cropping module under Irrigated condition.

Material and Methods
The study was made under on -farm trial on farmer field of district Kaushambi under Krishi Vigyan Kendra Kaushambi during 2016-17 and 2017-18. The soil of experimental field was sandy loam in texture, neutral in reaction (pH 7.2), low in organic carbon (0.39%), low in available nitrogen (140.83kg/ha), medium in available phosphorus (11.33kg/ha) and norms available potash 219.7kg/ha. Highly profitable different cropping system was taken in Randomized block design with five different cropping module with three replication. All the recommended package of practices for irrigated conditions was adopted. Immediately harvest of previous crop succeeding crops were sown under different cropping season.

Results and Discussion

Performance various cropping module under different seasonon Yield and other parameters over Control (Rice – Wheat cropping system)

The equivalent yield and economics of different cropping module over control (Rice- Wheat cropping system) has been presented in Table 1. It is evident from both table that Maize (for Cob)-Potato-(K-Ashoka)-Late Wheat (DBW-14) –Moong (PDM-139) was more effective in respect of equivalent yield (311.45 Q/ha.) with high economic return followed by Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139)-243.50 Q/ha., Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14) -208.12 Q/ha., Rice(Hybrid/PHB-71) –Wheat (PBW-343)- Moong (PDM-139)- 119.2 Q/ha. over Rice(HybridPHB-71)-wheat (PBW343) 106.45 Q/ha. cropping system. Maize (forCob)-Potato-(K-Ashoka-LateWheat (DBW-14)-Moong -(PDM-139) cropping module gave 192.94% higher equivalent yield followed by Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139)- -120.6% , Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)- 95.79%, 12.18% higher equivalent yield over Rice-wheat cropping system The positive effect of preceding Berseem, green manure, mustard, potato and gram + mustard was also reported by Sharma and Jain (1997) [7], Yadav *et al*., (2014) [8], Chouriya (2016) [1] and Jugnahake *et al*., (2018) [9].

Performance of economics of various cropping module under different season over control (Rice –Wheat cropping system)

Data pertaining to Gross and Net profit of different cropping system have been given in Table-1. After perusal of the result it is clear that maximum net return was maximum obtained Net profit was maximum obtained Rs. 239995 /ha in Treatment-1-Maize (for Cob)-Potato-(K-Ashoka-Late Wheat (DBW-14)-Moong-PDM-139) followed by Rs. 176165 /ha in T2-Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139), Rs169280/ha in T3 Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14) and Rs.130760/ha in T4 Rice(Hybrid/PHB-71) –Wheat (PBW-343)- Moong (PDM-139) over rice wheat cropping system Rs. 99394.5/ha.. Maximum Benefit cost ratio 3.5/ha was obtained in Maize (for Cob)-Potato-(K-Ashoka-LateWheat-DBW-14-Moong-PDM-139 cropping module followed by 3.04 in Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139), 3.02 in Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14), while Rice-Wheat cropping system gave B:C ratio 2.5. The net income of treatment T1 was Rs 23995/ha. Showed dominancy with 141% higher with 400% cropping intensity over T5 control (Rice –Wheat system) i.e. Rs 99394/ha. Similar finding were also reported by Mourya *et al*., (2011) and Jugnahake (2018) [9].

Table 1: Performance of different parameter under various cropping module.

Treatment	Yield/ha 2016-17	Yield/ha 2017-18	Mean Yield/ha	Gross Cost 2016-17	Gross Cost 2017-18	Mean Gross Cost (Rs/ha)	Gross Return 2016-17	Gross Return 2017-18	Mean Gross Return (Rs/ha)	Net Return 2016-17	Net Return 2017-18	Mean Net Return (Rs/h)	B:C 2016-17	B :C 2017-18	Mean of B:C
T1-Maize for Cob(Kav.218) - Potato-(K-Ashoka-Late Wheat-DBW-14-Moong-PDM-139	311.15	311.75	311.45	92620	92910	92765	332310	333210	332760	239690	240300	239995	3.5	3.5	3.5
T2-Sesame(Sekhar)–Early Potato(k Ashoka)-Late Wheat(DBW-14)-Moong (PDM-139)	234.9	234.1	234.5	86520	86625	86572.5	262320	262790	262555	175800	176165	175982.5	3.04	3.05	3.04
T3-Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)	208	208.45	208.125	83480	83520	83500	252790	252800	252795	169310	169280	169295	3.02	3.02	3.02
T-4-Rice(Hybrid/PHB-71–Wheat-PBW-343-Moong-PDM139	119.2	119.3	119.25	73640	73850	73745	204525	204610	204568	130885	130760	130822.5	2.7	2.77	2.73
T-5- Rice (PHB-71/hybrid – Wheat(PBW-343)	106.6	106.3	106.45	63326	63460	63393	162765	162810	162788	99439	99350	99394.5	2.5	2.56	2.5
C.D. at 5%	37.882	26.999	27.206												
SE(m)	11.439	8.152	8.215												

Effect on chemical properties of soil during assessment of different cropping module under different season

The chemical properties of soil after completion of crop cycle of different cropping system have been given in Table 2 and 3 Which reveals that soil pH and electrical conductivity were almost normal as compare to initial status. Organic carbon status was found to increase by 17.94% to 23..07% under Maize (for Cob)-Potato-(K-Ashoka)-LateWheat-(DBW-14)-Moong-(PDM-139), Sesame(Sekhar)–Early Potato (K. Ashoka)-Late Wheat (DBW-14-Moong (PDM-139), Rice (RH-10)-Veg pea (PSM-3)-Late Wheat(BDW-14) and Rice(Hybrid/PHB-71 –Wheat (PBW-343)- Moong (PDM-139) cropping module while organic carbon status was reduced in Rice –Wheat cropping system by 2.56% as compared to initial status. It may be due to addition of pulses and other crops which add more organic matter into soil as compared to Rice- Wheat cropping system. Available nitrogen status after completion of crop cycle of different cropping system is given in Table 2 and 3 reveals that available nitrogen status was increased by 10.62% to 21.12% under Maize (for Cob)-Potato-(K-Ashoka)-LateWheat-(DBW-14)-Moong-(PDM-139),Sesame(Sekhar)–Early Potato (K. Ashoka)-Late Wheat (DBW-14-Moong (PDM-139), Rice (RH-10)-Veg pea (PSM-3)-Late Wheat(BDW-14) and

Rice(Hybrid/PHB-71 –Wheat (PBW-343)- Moong (PDM-139) and maximum reduction in available phosphorus was noted in rice-wheat cropping system as compared to initial status. Available potash status was increased by 34.45% to 73.19% over initial status. Similar result were also reported by Jugnahake *et al*., (2018) [9].

On the basis of present field experiment that Maize (forCob)-Potato-(K-Ashoka-Late Wheat (DBW-14)-Moong-PDM-139) was found more remunerative for income generation and family nutrition among all the cropping module which was assess during field experiment while by Maize (for Cob)-Potato-(K-Ashoka-Late Wheat (DBW-14)-Moong -(PDM-139) cropping module gave 192.94% higher equivalent yield followed by Sesame –(Sekhar) –Early Potato –(K-Ashoka)-Late Wheat (DBW-14)-Moong (PDM-139)- -120.6% , Rice (RH-10)-Veg pea (PSM-3)Late Wheat(DBW-14)- 95.79%, 12.18% cropping module were also found superior than rice-wheat existing cropping system.

Table 2: Pre Soil analysis before assessment of different cropping module under different season

Treatment	pH	EC Mmhos/cm-1	OC g/kg	N avail. Kg /ha-1	P avail. Kg /ha-1	K avail. Kg /ha-
T1-	7.2	0.41	0.23	108.69	11.45	310
T2-	7.2	0.41	0.24	10.9.82	12.3	310
T-3	7.3	0.41	0.24	108.69	12.5	310
T4	7.1	0.33	0.24	108.60	12.5	311
T5	7.2	0.33	0.24	108.69	12.56	325

Table 3: Post Soil analysis after assessment of different cropping module under different season

Treatment	pH	EC Mmhos/cm-1	OC g/kg	N avail. Kg /ha-1	P avail. Kg /ha-1	K avail. Kg /ha-
T1-	7.2	0.41	0.48(23.07)	197.9(20.81)	13.8(-15.49)	380.5(73.19
T2-	7.2	0.41	0.48(23.07)	197.9(20.81)	13.8(-15.49)	380.5(73.19
T-3	7.3	0.41	0.47(20.51)	119.4(21.10)	14.3(-12.63)	332.4(51.29)
T4	**7.1**	0.33	0.46(17.94)	116.3(20.87)	12.6(-22.84)	295.4(34.45)
T5	**7.2**	0.33	0.38(-2.56)	112.69(-3.12)	10.2(-37.53)	372(69.32)

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